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Business Revival Will Release Large Machine Tool Purchases

By RUSSELL J. WALDO

ONE impelling reason for buying plant equipment is to replace machinery that has been worn out. Another reason for purchasing equipment is to lower costs. The extremely low level of business in the past two years has discouraged such expenditures. The tightness of credit has also been an impediment.

Now that tension in our banking situation has been relieved, the question arises as to what the accumulated equipment needs of our metal-working industries really are. Is it a fact, as has been alleged by popular writers, that pre-panic overexpansion of our plants was so great as to preclude active buying of equipment for years to come?

Fortunately, so far as machine tools are concerned, THE IRON AGE is able to give an emphatic answer in the negative. The accompanying survey demonstrates that the accumulated requirements of American industry are large and that their purchase merely awaits signs of business revival.

In normal times, when plant equipment wears out or becomes antiquated, it is replaced. A depression does not interrupt obsolescence or depreciation but does cause the postponement of machinery purchases. It is a natural assumption that large equipment requirements have accumulated in the past two years and that when business takes an upturn many deferred orders for machinery will be released. To ascertain the facts regarding latent machine tool needs the writer sent questionnaires to 853 industrial executives, of whom 846 responded. Those who sent in answers included 227 presidents, 158 vice-presidents, 96 treasurers, 168 purchasing agents and 197 superintendents.

The returns fully justified the belief that a large volume of dormant machine tool demand has accumulated. In some cases purchases have been delayed pending the receipt of more favorable prices or more liberal trade-

in allowances, but the predominant reason, of course, was the reluctance to make expenditures so long as business activity continued to recede. The number of executives who either stated directly or left the plain implication that they had not made purchases of necessary machines during the depression was unusually large. In fact, it was a casual remark over a year ago by one of the larger metal manufacturers—"When business does start to pick up we will be required to add to our mechanical equipment to meet the pressure of

even normal business"—that prompted the writer's investigation.

Automatic Machines Lead in List of Prospective Purchases

Automatic machines of various sorts led among the machines listed as needed. While only a few executives indicated that they would buy on a given date, in every instance it was apparent that the machines would be required as soon as plant operations increased. Of the executives responding to the questionnaire 829 reported that they would purchase a total of 2166 automatic machines. Special-purpose machines numbered 487, while automatic machines with special equipment accounted for another lot of 347. Four hundred sixty-seven executives indicated that the machines they listed would be bought to replace worn or obsolete equipment, while 158 failed to give express reasons. Answers from the remaining 221 executives made it clear



that most of the 1466 machines that they would buy would represent added equipment.

In 35 replies it was stated that single-spindle screw machines would be replaced by multi-spindle machines. Eighteen respondents reported that they would replace a large model with a smaller model, but in no case was a change from a multiple-spindle to a single-spindle machine contemplated.

Large Requirements in Screw Machines

Multiple-spindle screw machines led in the list of particular types of automatic equipment slated for purchase, the total being 642. One company reported that it intended to buy seven multiple-spindle machines to take the place of 16 single spindles. In fact, the replacement motive is indicated in the case of 363 machines, which are to be paid for in part by trading in present equipment. The remaining 279 machines apparently represent equipment to be added as distinguished from replacements.

There were 472 reports listing a total of 587 single-spindle screw machines, of which only 43 were definitely designated as replacements. One company reported that it hoped to buy 11 within the next year. Of the entire total, 148 machines may be bought second-hand.

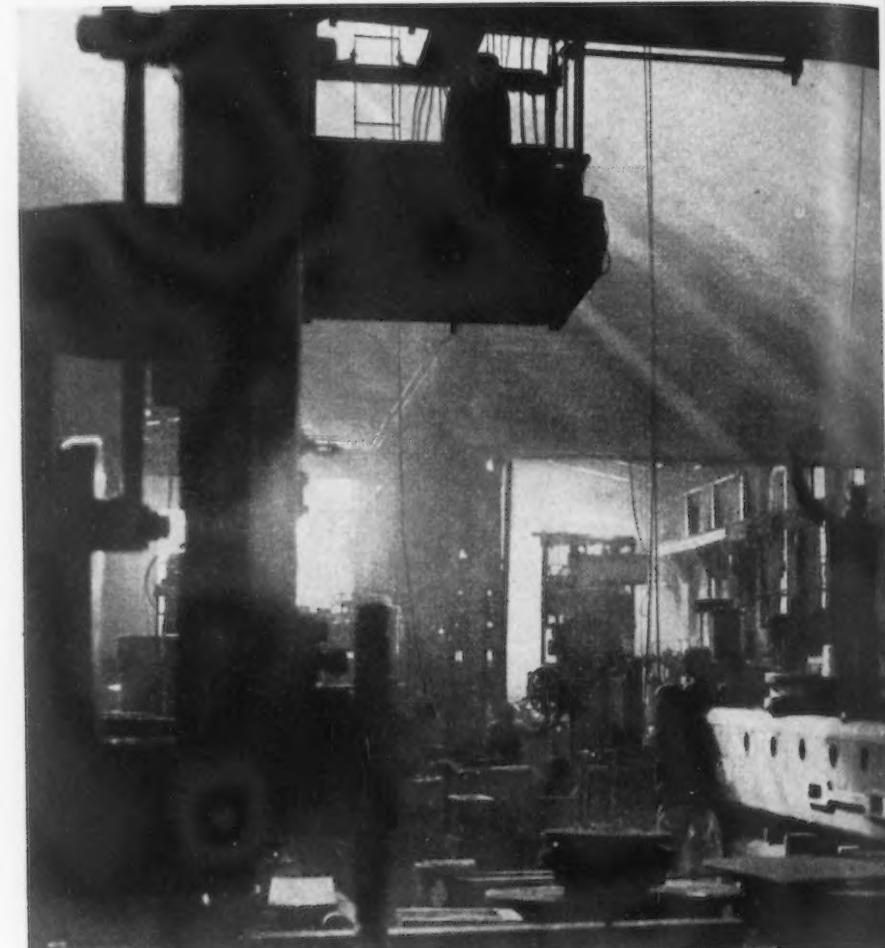
Automatic gear cutters and shapers to be bought total 586 machines. Every one of the 321 companies reporting is a maker of machinery and not a contracting shop. Of the total number responding, 123 contemplate replacement purchases of 134 machines.

The installation of new punch presses with automatic feeds or the addition of automatic feeds to presses now in use is contemplated by 136 executives. Presses which would represent additional equipment number 208, while 48 would fall into the category of replacement purchases. Of the presses to be replaced, 14 may be used machines.

Automatic tool room machines were listed in five reports. Eighteen answers indicated interest in such equipment, but no definite decision as yet to make purchases. None of these contemplated orders were designated as replacements.

Returns Reveal Imposing Total of Lathes

Of the 846 executives who responded to the questionnaire, 731 listed a total of 1388 lathes of various types and sizes among their expected purchases. Lathes for tool room work number 862, engine lathes for production departments and machine repair depart-



ments 23, vertical turret lathes 66, turret lathes for production departments 437.

Lathes designated as being for replacement total 667, of which 407 are tool room lathes, 256 are production department turret lathes and four are vertical turret lathes.

An interesting disclosure regarding the tool room lathes to be replaced was made by 27 executives, who reported that such equipment would be transferred to the production or machine repair departments.

Six hundred thirty-seven reports showed a total of 2121 drill presses. Upright drills to the number of 1589 are listed by 392 executives. Two hundred seven sensitive drills are reported by 97 companies. The 44 remaining returns list 128 drills of other types, including 88 radial drills.

Drills designated as replacements total 836, of which upright drills account for 648, sensitive drills for 64, gang drills 78 and other types 46, including 13 radial drills.

Of the 1589 upright drills to be bought, 147 may be purchased second-hand. Similarly used equipment may be bought in the case of 27 sensitive drills, two gang drills and six miscellaneous drills, including one radial.

DISTRIBUTION OF ANSWERS TO QUESTIONNAIRE BY STATES

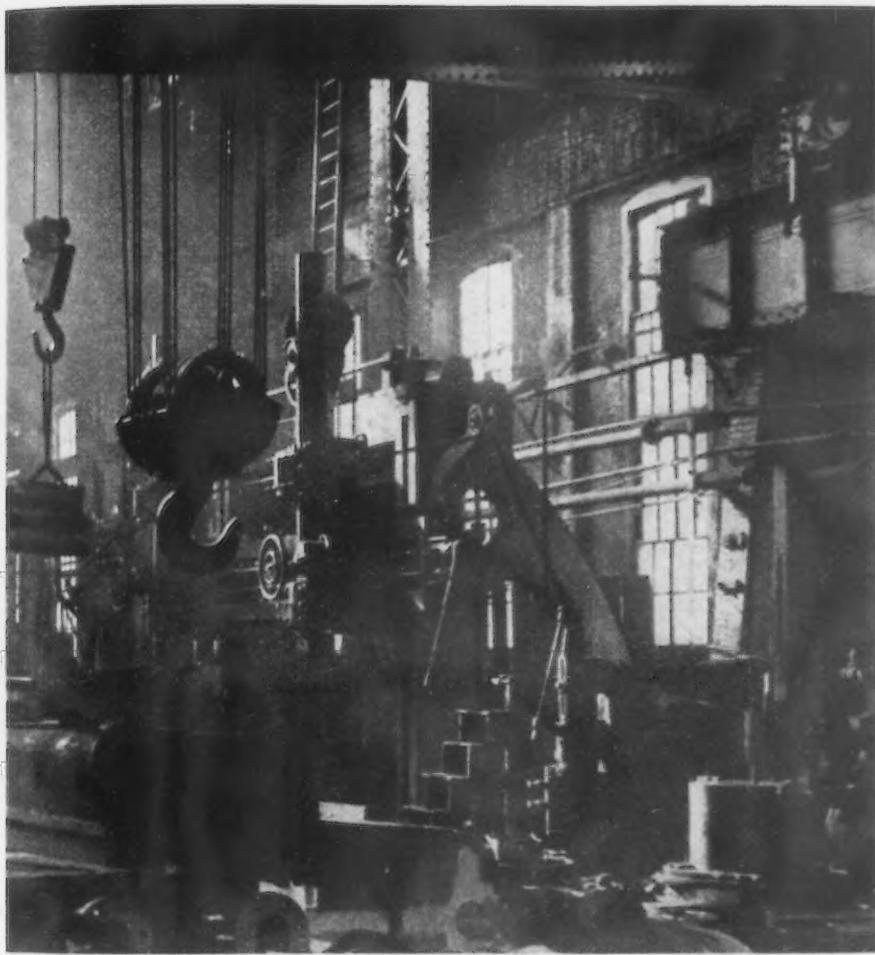
New York	163
Michigan	151
Pennsylvania	127
Massachusetts	94
Ohio	94
Illinois	83
Indiana	77
Connecticut	31
Rhode Island	26

A total of 488 grinding machines was reported in the returns of 378 executives. Three hundred seven machines are designated as representing additions to present equipment, 33 are for the replacement of worn equipment and 113 are larger machines to replace smaller models now in use. Of the machines to be replaced 109 are to be retained for other work.

A surprising revelation was that a major part of the reports indicating the need for new grinding equipment also listed lathe requirements.

Large Miscellaneous Requirements

Punch presses of various types and sizes are to be purchased by 207 plants, the number of presses listed



**DISTRIBUTION OF RETURNS
ACCORDING TO PRODUCTS MADE**

Castings	66
Automotive parts	62
Metal-working machinery	47
Railroad equipment	44
Contractors' equipment	42
Office equipment	42
Engines	36
Pig iron	32
Aluminum products	27
Mining equipment	27
Plumbers' supplies	24
Small parts	21
Farm equipment	21
Gas equipment	19
Clocks, watches, etc.	18
Leather and cloth-working equipment	18
Electrical equipment	17
Rolled metals	16
Wood-working equipment	14
Heating equipment	12
Office furniture	11
Hand tools	11
Printing equipment	11
Automobiles	4
Radios	4
Miscellaneous mechanical equipment	137
Miscellaneous products	63

totaling 608. Presses coming under the category of added equipment number 434, while there will be 174 replacements, of which 16 may be bought second-hand.

Shapers to the number of 623 were listed by 431 executives. Those designated as added machines number 376, while replacements account for 131. In only 11 cases will used machines be considered for outright purchase or "trade-ins." Of the entire number of shapers to be bought, tool rooms will take 196, of which 184 will represent additions to existing equipment and six will be replacements.

Eighty-seven gear shapers are to be placed by 81 shops. Machines to be added number 86, the remaining machine replacing another size. Used machines are to be considered in two cases.

Milling machines numbering 361 are to be purchased by 328 plants. Two hundred forty-six will be additions to present equipment, 97 will replace smaller machines and 18 will take the place of worn out equipment. Only six used millers are to be bought.

Fifty-three boring machines are to be placed by 46 shops. Forty-eight will be added machines and five will replace smaller tools. Used machines

will be considered in eight instances.

Cut-off saws to the number of 108 will be bought by 97 plants. Ninety-two will represent added equipment, while 16 will replace worn out machines. Only nine executives reported that they would consider used machines.

Tool grinders to the number of 69 are to be purchased by 62 plants. Sixty-six machines fall into the category of added equipment, while three will be replacements. Three executives will consider used grinders.

Riveting machines are to be bought by 21 plants. Of the 29 machines listed, seven represent equipment additions and 22 are replacements. Used machines are not mentioned.

Hobbing machines are listed by 12 plants. Of a total of 12 machines, 11 are to be "added" and one will replace a worn tool. Only two used machines will be considered.

Chucking machines to the number of 16 will be bought by 14 shops. Thirteen will represent added equipment and three will be replacements. One used machine will be considered.

Bending and straightening machines to the number of 26 were listed in 23 reports. Eleven will be added and 15 will be replacements of other sizes. In two instances used equipment may be bought.

Shears are listed in 17 reports. Of 22 machines to be purchased, 14 will be additions and eight replacements of smaller or worn shears. One executive will consider a used machine.

Twenty-seven forging machines are to be bought by 21 shops. Sixteen will be additions and 11 will be replacements. Two used machines will be considered.

Roll-forming machines to the number of 12 were listed in 11 reports. Added machines number nine, and replacements will account for three. Only new equipment will be purchased.

Corrugating and crimping machines to the number of nine were listed in as many reports. Additions account for six machines and replacements for three. No used equipment to be considered.

Eight seaming machines are to be bought by seven shops. Four machines will be replacements. No used equipment will be purchased.

The growing interest in grinders is reflected in a superintendent's comment, as follows: "For several years we have been using grinders to do the work formerly done upon the lathe in the finishing operation. This step has proved most economical. The

(Concluded on page 763)



NIGHT at the Newburgh mills of the American Steel & Wire Co., Cleveland, with the ladles of iron about to be poured into the mixer.



GASES IN PIPE CAVITY AND IN GAS HOLES IN INGOTS

By HENRY D. HIBBARD

Consulting Metallurgical Engineer,
Plainfield, N. J.

HERE are three common kinds of gas holes in commercial steels, each of which occurs in a distinctive way, and they are manifestly caused by different gases or mixtures of gases. They are (1) skinholes, (2) intermediate holes and (3) central holes, so named from their location in the ingot; skinholes being nearest the outside surface, intermediate next and central near and along the central axis. They will be considered herein according to their occurrences in killed, partly killed, and rimming steels respectively.

Exceptional holes will be mentioned later.

In Killed Steel

A perfectly killed steel ingot contains no gas holes, its only free gases being those which occupy but do not cause the pipe cavity. Their largest ingredient is usually if not always hydrogen, though their composition probably varies in the different kinds of steel. They are perhaps always inflammable, for they often burst into flame when a large ingot is broken in two at the pipe after having been cut nearly through in the lathe. As the parts separate they are likely to make a spark by impact or friction, which ignites the gas.

Talbot found the gases—collected over water—from the pipe cavity of a steel ingot, killed with aluminum, to be over 80 per cent hydrogen, with over 15 per cent nitrogen. The steel had presumably between 0.6 and 0.7 per cent carbon, though he does not say so explicitly. These gases probably always contain some ammonia (NH_3), which of course would not be found when the gases are collected over water, as this would quickly dissolve it. They may also be in part CO , CO_2 , CH_4 and HCN .

The relative solvent powers of the unoxidized commoner elements for gases, in preventing their separation

GAS holes occurring in steel are mainly of three kinds: skinholes, intermediate holes and central holes. They appear in corresponding sections of the ingot. Steel perfectly killed has no gas holes; rimmed steel has many. But in properly made rimmed steel the gas holes are so located that they do little or no harm.

from steel in cooling, have been computed by one observer to be manganese 1, silicon 5 and aluminum 90. Titanium ranks near silicon in this respect. The assumption that their power is the same for all gases may not be strictly true. There is some ground for belief that manganese and aluminum have proportionately greater power over hydrogen than that given.

In Partly-Killed Steel

In a partly killed steel ingot the number, size and kinds of gas holes, and perhaps the composition of the gases which cause and fill them, vary with the degree of killing.

Central holes are always present in the upper central part of the ingot in the vicinity of the pipe, where they are largest and most abundant, which

seems to indicate that the gases they contain may be somewhat like those of the pipe cavity. In less perfectly killed steel they may range downward at random along or near the axis, in number and size inversely to the degree of killing. In some ingots the lower part may be free from them, due apparently in part, at least, to the pressure of metal above.

Intermediate holes do not occur in such steel. Common, partly killed steel, such as rail steel, may contain skinholes in a zone around the upper quarter or even half, more plentiful the nearer the top. When the skin over them is thin they cause the usual defects due to skinholes. The bottom part of the ingot may be free from them as from central holes, due presumably to the pressure of the metal above. They are probably caused by and filled mostly with hydrogen, and may be avoided by having the bath in the furnace well worked out, and addition of aluminum in the mold.

Unless the steel rises in the mold a pipe cavity somewhat smaller than in killed steel will be present, the gases within which may differ more or less from those in the pipe of killed steel of the same grade. In partly killed steel of unspecified composition, but presumably containing between 0.6 and 0.7 per cent carbon, Talbot found the pipe gases, collected over water, to be over 90 per cent hydrogen, with a few per cent each of nitrogen and carbon monoxide.

Pipe gases are in part ammonia (NH_3), but in varying proportions. Sometimes a pipe contains enough of that gas to escape with a hissing sound and to blow chips off the drill which opens it, and to permeate widely the air of the shop where it is cut open, so as to bring tears to the eyes of men nearby. Yet gas from another pipe in steel made to be

(Concluded on advertising page 20)



SYNCHRONIZING OVEN OPERATIONS

By PHILIP KRIESEL

Spooner & Kriegel, Industrial Consultants
New York

THE outer shell of the refrigerator box is formed by punching and shaping the sides and front in four operations, with the back put in place under hydraulic pressure. The bottom is laid mechanically into place and flattened against the seams of the four sides. The seams are then all welded and the welded surfaces are ground smooth. The bottom is drilled at the four corners and tapped for fastening the legs. The inner shell goes through practically the same operations of blanking, seaming, joining the two sides to the bottom, welding and grinding. The outer panel of the door is blanked out, pressed out, punched, and mitered at the corners, which are welded. The piece of sheet steel remaining after punching the front of the outer shell is shaped and punched into the inner panel of the door.

From the forming department, the four component parts of the box are conveyed to the cleaning department where the metal surfaces of each box are subjected to a thorough washing in horizontal slat conveyor washing

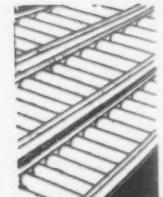
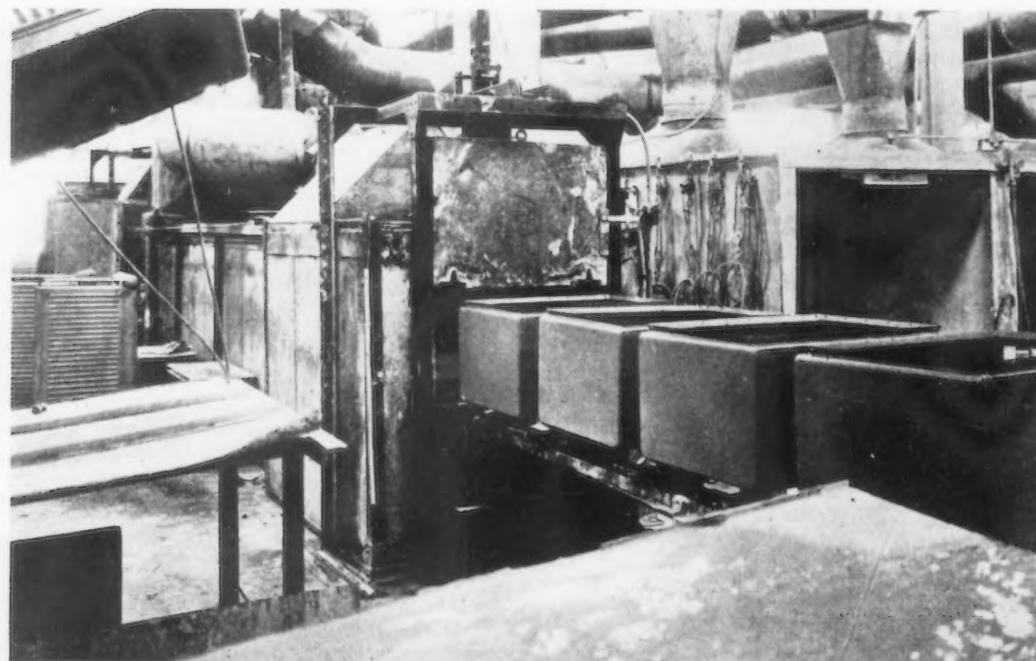
machine, passing thence through rinsing and drying operations. Sand blasting follows, leaving the metal surface clean, dry and ready for application of lacquer and porcelain finishes.

As is generally known, the interior of automatic refrigerators has a porcelain surface throughout, while the exterior may have either a lacquer or porcelain finish as desired. The two processes being entirely different, in method of surface coat application and baking, separate departments are maintained for each.

Overhead chain conveyors carry the outer shells, outer door sections and legs on independent systems from three separate cleaning sources to the finishing room, where the first or prime coat is applied. There are two independent lines of two conveyors each running through spray booths into two ovens. One conveyor in each group carries the outer shells and the other both outer door sections and legs. As each conveyor moves the parts past the spray booth the workmen apply the prime coat to the

outer surface. The work then travels on toward the oven for baking.

The ovens consist of upper and lower compartments to permit the travel of one conveyor in each compartment. One of these ovens is about 76 feet long, 36 feet wide, 14 feet high. The outer shells enter the lower compartment through a heat seal by dipping under the floor level into the baking section proper. The doors and legs are likewise carried down so as to move into the oven from below the floor of the upper baking compartment. In this manner heat losses are minimized through direct openings into the room atmosphere. Each conveyor carries the work in eight parallel passes back and forth the entire length of the oven for a total distance of about 570 feet. The baked work emerges at the same end of the oven through bottom heat seals. There is thus a constant flow of work into the oven at the right and the same at the left parallel to the incoming line, cool and ready for the first lacquer spray.



A ROW of porcelain coated inner shells just removed from the drain (shown in the foreground) entering the predrying oven.

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IN REFRIGERATOR MANUFACTURE

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STRAIGHT line flow through heating and other operations characterizes the making of General Electric refrigerators. Conveyorizing has made possible the continuous, uninterrupted progress of parts from the state of raw material to finished refrigerator.

Beyond the cutting, forming, stamping and other preliminary operations there are hardly two consecutive operations in assembly, testing or paint finishing that do not involve drying or baking in ovens. Throughout all of these oven operations, the rate of work motion has been arranged to synchronize the heating with previous and succeeding operations.

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The oven is built of sectional, insulated, steel panels assembled so as to give the highest thermal efficiency, greatest strength and durability, yet provide such flexibility of erection that alteration or removal is made easy. In fact, since its erection, important alterations have been made to meet the increasing production schedule without serious interference to operating methods or changes in other equipment. The oven is electrically heated, with ribbon type heaters mounted in the baking section to supply uniform heating conditions. Adequate thermostatic control is provided to regulate the heat input and maintain a temperature of 400 deg. Fahr. A properly placed ventilation system embodying exhauster fans for removing volatile vapors and a fresh air circulation booster fan for each compartment insure uniform heat distribution, clean work and correct baking conditions.

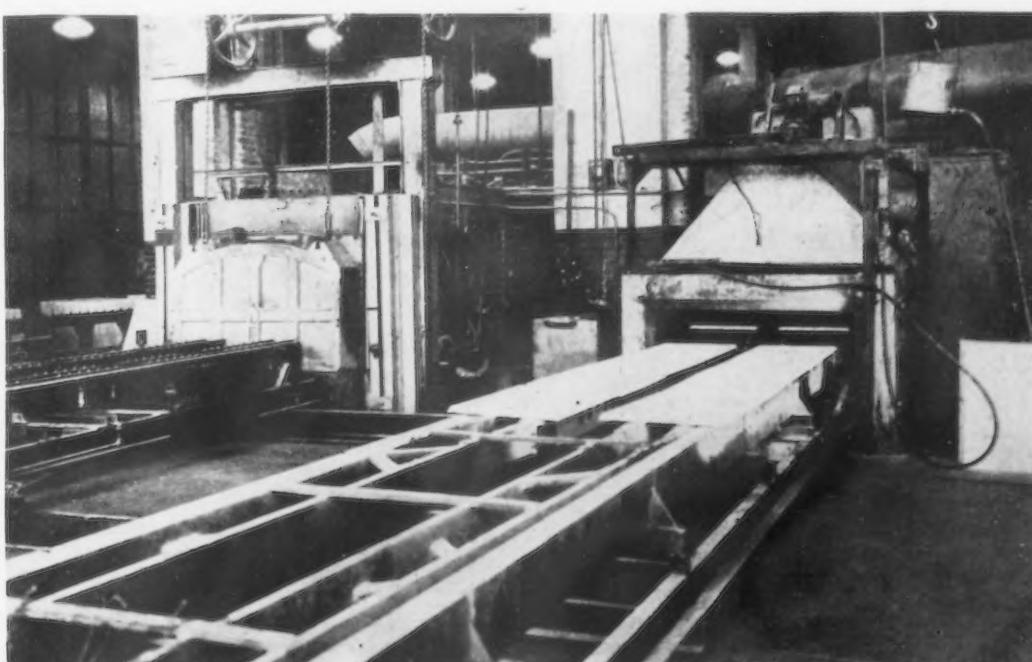
Two coats of lacquer are sprayed over the baked prime coat and after each operation the overhead conveyors carry the work into ovens for

drying at 120 deg. Fahr. The lacquer drying ovens are similar in arrangement to the one described above, although of course somewhat smaller because of the shorter drying cycle at lower temperature. These ovens are heated by steam coils and are adequately ventilated and controlled as to temperature distribution and heat application. The finished work passes from the lacquer room through a cycle of moving storage to the assembly line.

In the porcelain enameling division the inner shells and inner door sections undergo quite a different and rather more involved treatment. The ground coat of enamel is applied on

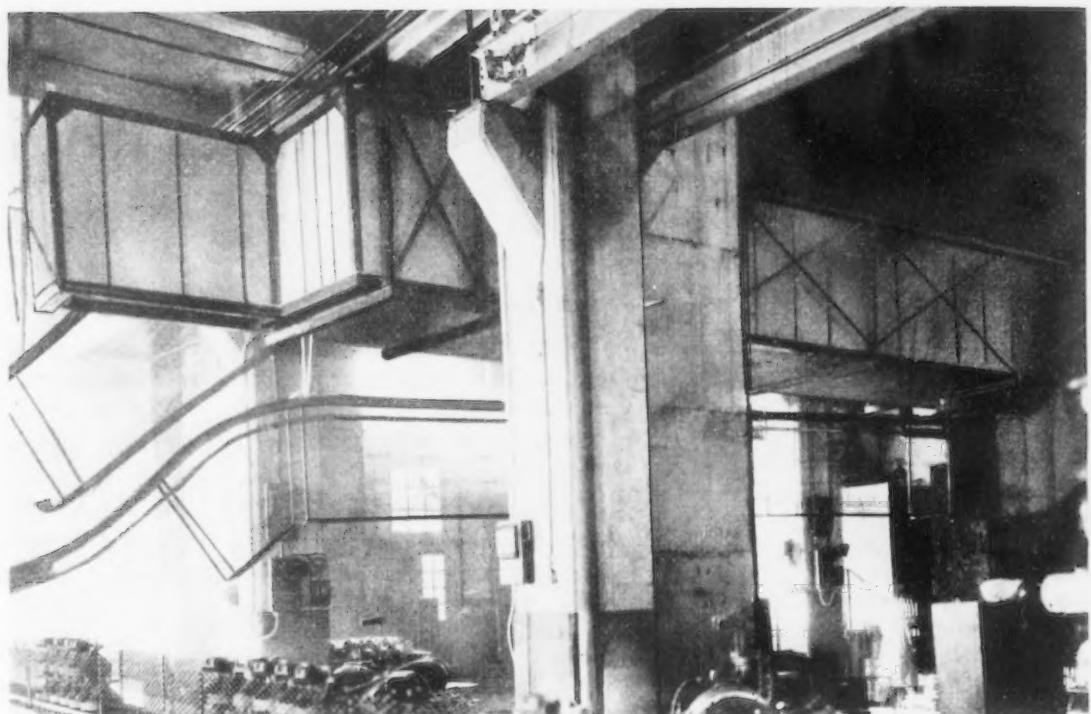
the inner shells by dipping them in long tanks filled with grayish white liquid and agitating them until both inner and outer surfaces are completely covered. They are then tilted to permit excess material to drain and placed on a short gravity roller conveyor leading to ovens for predrying the porcelain. The ovens are of the tunnel type with a two strand chain conveyor traveling in two parallel tracks running through to the discharge end. The shells move forward at a definite rate at a temperature of 200 deg. Fahr., allowing the moisture to be evaporated and carried off by exhaust fans leaving a glassy surface on the metal. As the shells reach the

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DISCHARGE end of predrying oven showing inner door panels being removed by fork from predrying oven and ready for transfer to the fusing furnace at the left.





VIEW of conveyor oven for normalizing compressor units, mounted far above floor level.



end of the oven, an electrically operated fork reaches in, lifts two parallel sets of three shells, emerges, moves to the right and places them into an electrically heated furnace for fusing the enamel. After a few minutes exposure to heat at 1600 deg. Fahr., the fork removes the work and places it on a moving conveyor to allow for cooling. The second coat of porcelain enamel is sprayed on and is sent through a predrying oven and the subsequent glazing furnace operation at 1500 deg. Fahr. Application of the third coat duplicates the second in

method of spraying, conveying, predrying, fusing and removal.

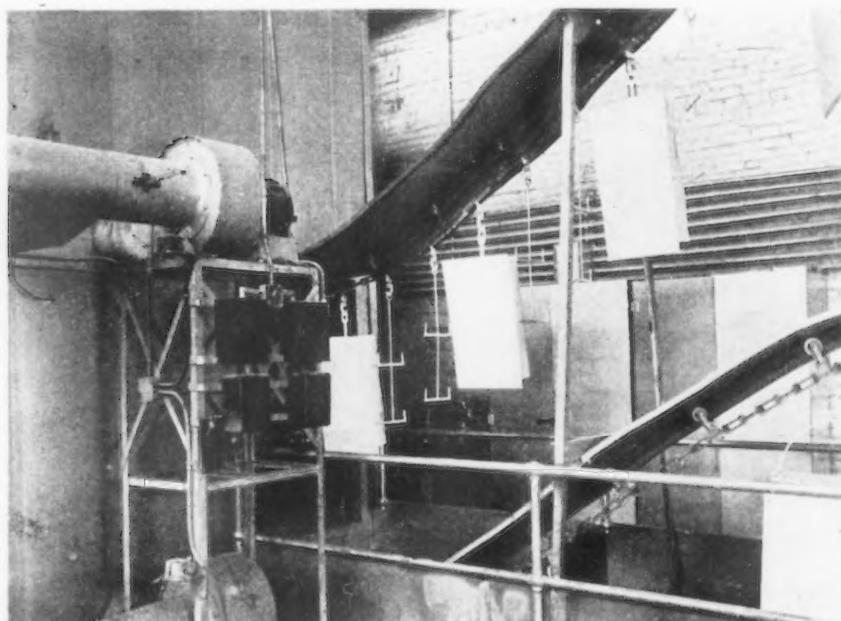
The faces of inner door sections and the panels constituting the outer walls of the all-porcelain finish refrigerators receive a similar treatment. The work, however, is accomplished in separate divisions in separate spraying booths, predrying ovens and furnaces. The sizes of both ovens and furnaces are such as to provide for most efficient loading, conveying and heating. These parts, like the inner shells, are sent to the assembly department where the legs and hard-

ware are attached, the outer shells of the boxes and doors are packed with insulating material, the inner shells are set in and secured to both outer shelves by means of black bakelite strips, fastened at the corners by metal angles. The finished, completely assembled refrigerator boxes are carefully inspected before packing.

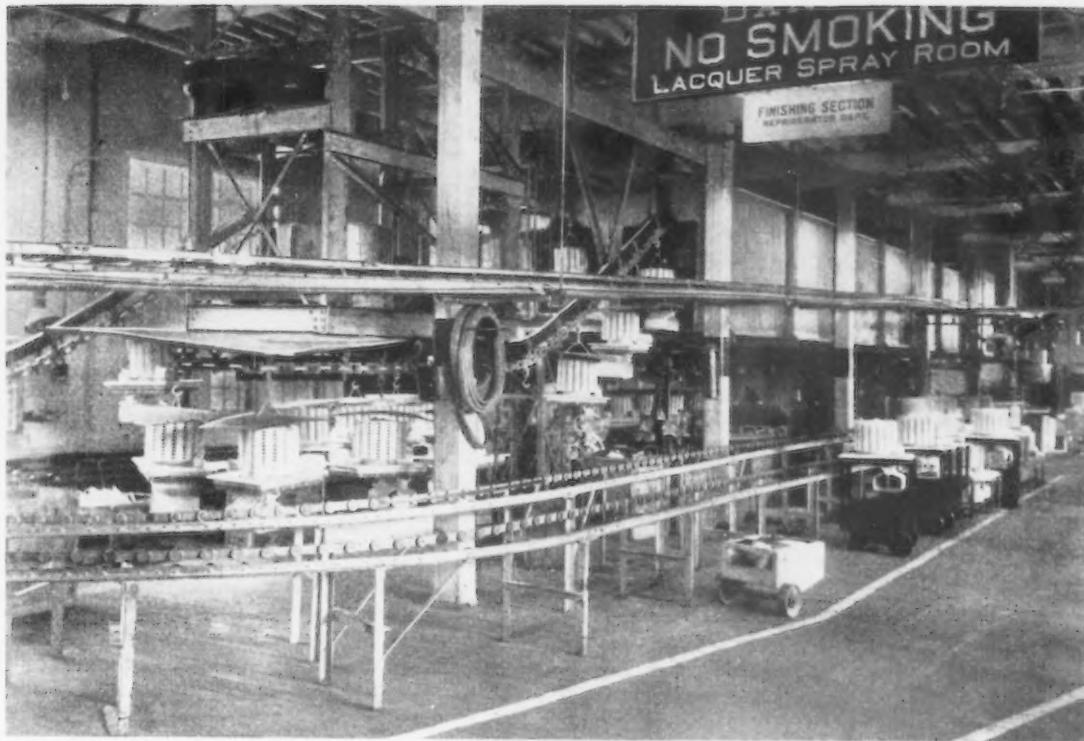
The Refrigerator Unit

The manufacture of the so-called "monitor" top involves considerably more operations than in the case of the boxes. Inasmuch as this is the operating unit there are more parts of small size, a greater number of assembly operations and testing. Oven uses here are important not only in baking the finish but in many of the preliminary heating operations.

Within the hermetically sealed bell of the compressor case are the motor and pumping mechanism. The windings in the motor are treated with insulating varnish and dried in ovens specially designed for the purpose. Certain other small parts in the bell housing are run through tunnel type conveyor ovens for evacuating moisture prior to their assembly with other small parts. One of the first operations involves a special normalizing treatment given to the refrigerator unit castings at 344 deg. Fahr. These castings, which have already been cleaned are placed in baskets which are suspended from hooks on a single chain conveyor. The work moves upward into a specially designed electrically heated oven suspended from the ceiling beams. The conveyor makes three passes through



Entering the prime coat baking oven, with upper conveyor carrying outer door panels into the upper compartment of the oven and the lower conveyor, carrying outer shells, dipping below floor level to enter the lower baking compartment.



THE lacquering room showing the complex arrangement of conveyors, ovens and shielded compressor tops moving into the oven.

the oven to emerge at the far end through a vestibule at a lower level, returning to the operator, cool and easy to handle in unloading. The oven is 40 feet long, 7 feet 8 in. wide, 5 feet high of insulated steel panel construction. It must be noted that the unique method of oven suspension has left the entire floor beneath free for other purposes.

The shell, ribs and coils of the compressor cases are formed, assembled, welded, ground, thoroughly cleaned and washed. Prior to the insertion of the moving mechanism the unit is blown out and run into a gravity roller type, electrically heated oven for removal of all moisture in the interior. The mechanism is then placed into the shell and another test is made to determine motor efficiency and possible leakage. Evacuation of the oil in testing and drying out again follows in a rather long heating cycle.

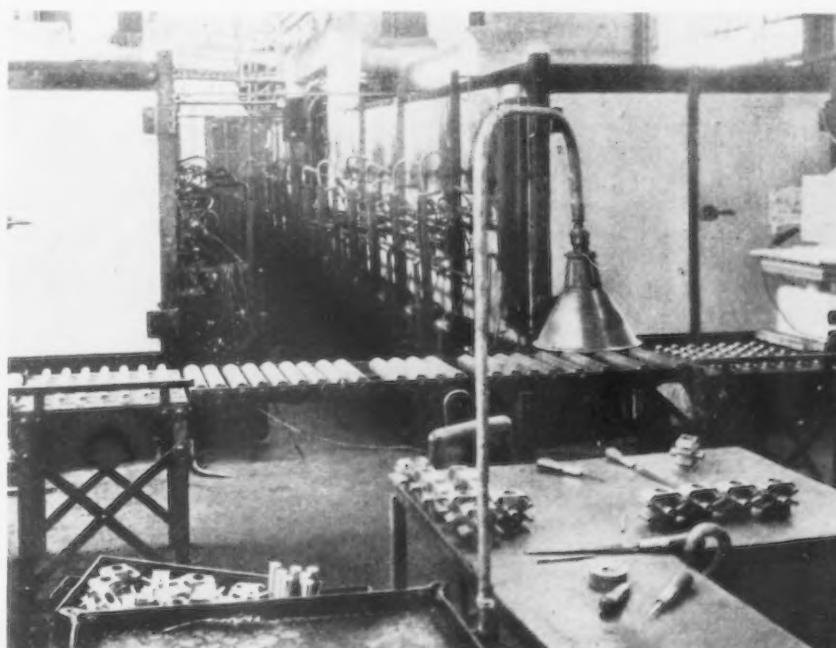
The compressor cases are then set on the refrigerator top and pressed into position. The top itself consists of an outer shell, which has been formed to the proper shape to take the compressor set on the refrigerator box top and the inner panel or top of the box interior, which is porcelain enameled and baked in the manner previously described. The inner panel of the box top is punched so as to permit connections between the icing unit in the refrigerator and the compressor case above it.

The assembled tops but minus the icing units are given the final test to simulate operating conditions, evacuated of moisture after test,

steam blown into coils for another test and finally dried out. In connection with these operations, two large ovens in one of the plants provide every facility for the drying out of the compressor coils and cases while under vacuum. Each of these ovens is of the gravity roller conveyor type, 36 feet long, 7 feet wide and 7 feet high.

They are supplied with warm air from external electric air heaters by means of a recirculating system. The tops are placed in the oven in such position that each unit is lo-

cated directly at one of the openings in the side of the oven so that connections can be made for the necessary testing and evacuation while the work is under heat. The test completed after a definite period, the work is pushed on for removal at the other end of the oven and a new set of units are run in. The icing unit is then attached to the top through the inner panel and the completely assembled and finished starter is mounted on the top at the left of the compressor case. This part, however, is covered with a paper wrapper to avoid



Two gravity roller conveyor ovens for testing and evacuating steam from compressor cases. Note the complicated testing apparatus along the oven walls.

a subsequent spray of lacquer thereon.

The last operation in the manufacture of the "monitor" top is the lacquering of the entire outside surface. The work moves into the lacquering room from the testing department on the single chain overhead conveyor directly to the spray booths. The white lacquer is sprayed on while the work moves steadily on and, reaching a point some twenty feet from the end of the oven, its direction is reversed and the tops are conveyed into the oven for the drying operation.

The oven, like all the others discussed, is of the sectional panel type, reinforced with structural steel members supporting it from the ceiling. Mounting the oven well above operators' level has permitted the use of the 400 sq. ft. of floor space below it for easier accessibility of the spray booth and other equipment. The oven itself is about 60 feet long, 8 feet wide, 5 feet 7 inches high arranged into two long tunnels. Heat at 110 deg. to 120 deg. Fahr. is supplied by means of steam coils running the length of the oven. Exhaust fans are provided to remove the volatile vapors. The work enters the oven at one side, runs the entire oven length and returns counterflow to the incoming work, emerging to be conveyed back to the spray booths for the second lacquer coat and repetition of the operation. At a convenient point near the oven careful inspection is made of the finish and any defective work is sent down an inclined gravity conveyor for refinishing. With final inspection of the monitor tops, the work is ready for packing and crating.

Can You Answer This?

DO you know of anyone successfully operating a continuous pickling machine? A recent study of our manufacturing sequence brought into prominence the relatively high cost of pickling. We make small fittings which all pass through the pickling baths before plating. Our other operations are nearly all automatic or semi-automatic and we are anxious to bring our pickling up to a similar degree of efficiency.

* * *

SHOULD parts which are to be nitrided be separated when packed in the nitriding box? Through an oversight recently the usual separators were omitted and a full box of parts went through the nitriding process without them. We have failed to detect any harmful results of this slip and would like to know what experience others may have had.

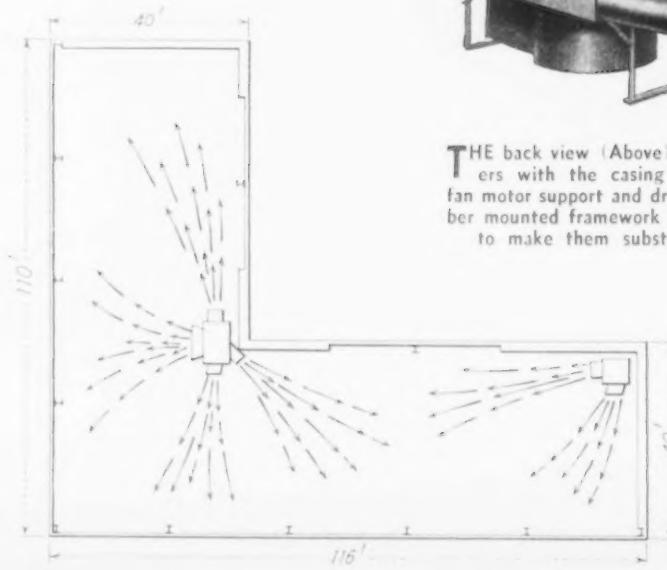
UNIT HEATING OF AN

AN unusual application of the unit heater idea for factory heating is now in operation in the plant of the American Broach & Machine Co., Ann Arbor, Mich. The heaters themselves are virtually warm air furnaces complete with blowers, and two such suffice for a building in the form of the letter L, 116 ft. in extreme length in one branch and 110 ft. in the other. One feature of the heaters is that the combustion chambers are of chromium steel sheets, and another is that the blowers for moving the air are mounted in a group in the upper reaches of the heater within the main casing.

The scheme of operation is for the furnace to deliver large volumes of air at relatively high temperatures with the heated air driven more or less horizontally at about the six or seven foot level, so that the warmest air is available at body height rather than at the upper levels near the ceiling.

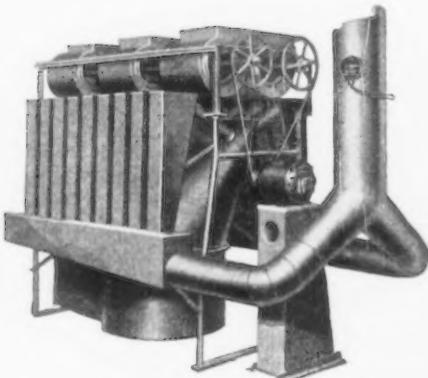
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EACH of the heaters (Below) has a group of six fans which are located above the heating surfaces and throw the air horizontally into the shop space, which is given a recirculation of the air at a rate of over six times an hour.



The accompanying sketch will give an idea of the layout. The building is of a single story, with an inside height of 22 ft. The furnaces are 80 ft. apart. The colder, lower strata of air of the interior reaches the bottom of the furnaces at approximately 55 deg. F. and leaves the top of the furnaces as high as 190 deg. Six Sirocco type fans are arranged in the top of each furnace, as indicated in one of the illustrations. These are rated to deliver 8500 cu. ft. of air a minute per furnace and a distinct warm air movement can be felt at a distance of 40 ft. from each furnace.

The furnaces burn oil, but, of course, they may use gas or stoker-fired coal as fuel. Their wedge shaped chromium steel combustion chamber, with its property of withstanding very much higher temperatures than ordinary steel plates, is of thinner material than usual in furnace construction, a fact emphasized as favoring heat transfers. The extra flue construction, for carrying the products of combustion and shown in the



THE back view (Above) of one of the heaters with the casing removed shows the fan motor support and drive and also the rubber mounted framework that carries the fans to make them substantially noiseless.

AN ANN ARBOR MACHINE SHOP

TWO heaters burning 6 or 7 gal. of No. 4 oil an hour serve 7500 sq. ft. of shop area by a circulation of hot air.

Each heater has a chromium steel combustion chamber and a battery of six blowers in the top to handle the hot air.

This would mean 66,000 lb. in an hour for both furnaces. For every degree in temperature that this amount of air is cooled after leaving the heater, there will be liberated 15,700 B.t.u. To offset an hourly heat loss for the building of 1,500,000 B.t.u., the air would thus drop in temperature about 95 deg. So, to have a final temperature of 55 deg., the issuing temperature need not theoretically be more than 150 deg.

This brief calculation would indicate marked flexibility as between volume of air and range of air temperatures attainable and consequently a capacity to meet a wide range of weather conditions. Then there is the fact that the heater as a heat producer lies in its entirety within the space to be warmed.

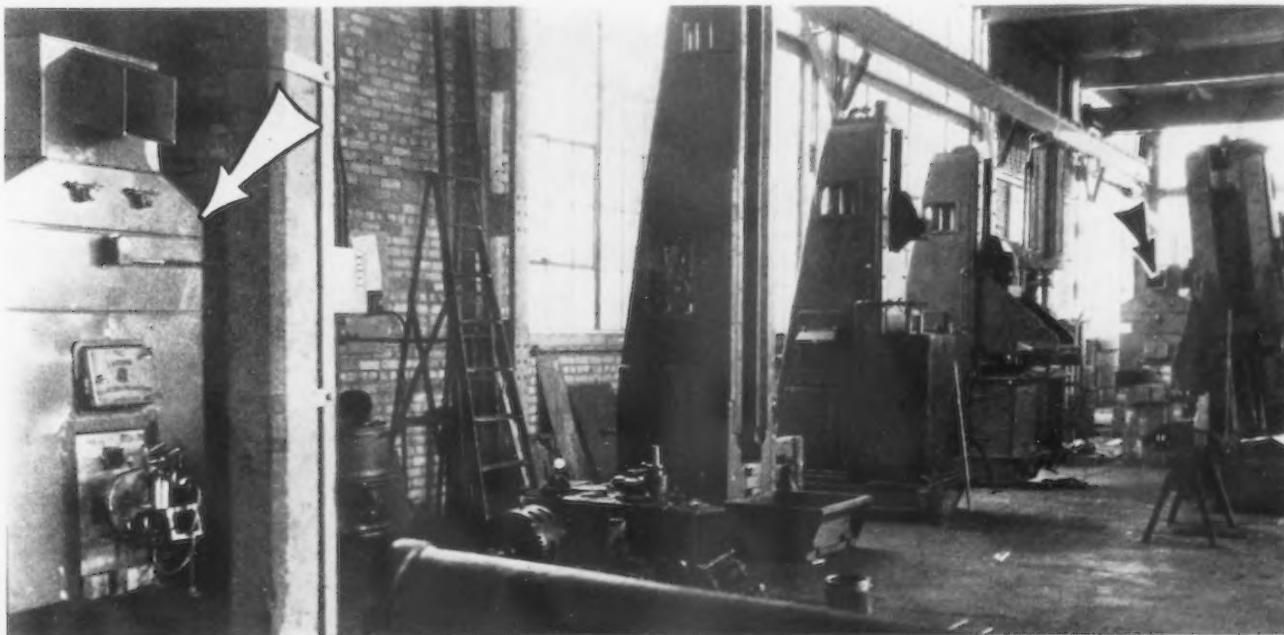
An entire heating season's experience is not yet available to secure cost data, but it is estimated that by burning the cheaper oils, the cost of heating will not exceed that of heating by steam with coal firing. It is estimated also that this system with stoker firing of coal should prove more economical than steam heating with hand firing. With a heating system of the type, there was of course no concern over steam pipes to be located to avoid such interferences as giving clear space for a traveling crane.

The installation was made by Murdock & Porter, Ann Arbor. The heater, which was placed on the market last May under the name of the Lansing Dailaire, by the Dail Steel Products Co., Lansing, Mich., is made in five different sizes and may be equipped with air-washing apparatus for air conditioning in the summer as well as winter.

A proposed modification of simplified practice recommendation No. 57, covering wrought iron and wrought steel pipe, valves and fittings, by eliminating the $3\frac{1}{2}$ -in. normal inside diameter pipe from table 3—"double extra-strong pipe"—has been distributed to all interests in the industry for approval. All other diameters and weights in the present draft of the recommendation are to be retained without change.

ARROWS point to the two heaters installed for warming the plant of the American Broach & Machine Co., Ann Arbor, Mich.

Offices of the American Gear Manufacturers Association have been moved from 3608 Euclid Avenue, Cleveland, to the Ninth-Vincent Building, same city.



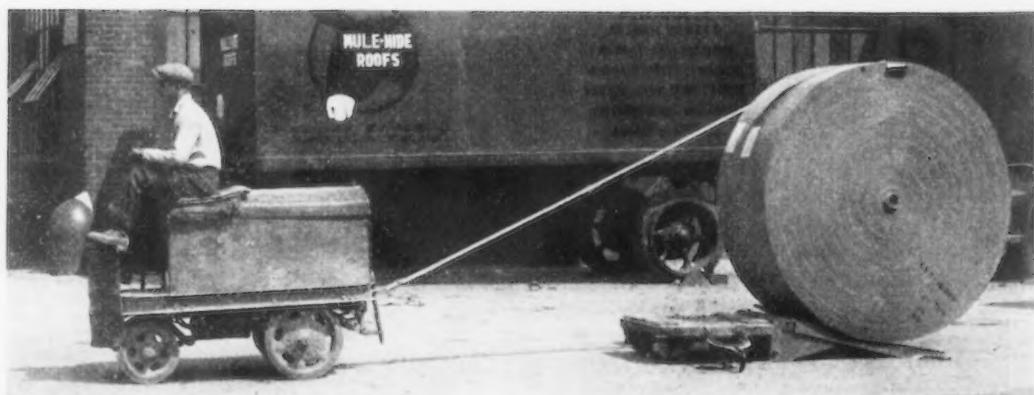
Industrial Transportation Ideas

SPECIAL built hand lift truck for handling cumbersome reels of cable. On the uprights is a quick locking rack arrangement so as to vary the height of the brackets which support the load. This is necessary as different diameter reels are handled. (Barret-Craven.)

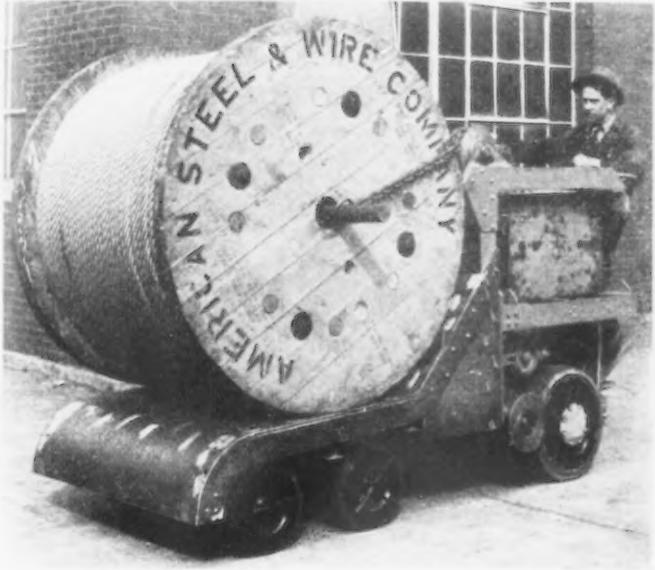


WHERE platform skids are used for departmental handling and storing of materials it is sometimes advisable to use hand lift trucks as trailers. This permits the tractor to handle more than one load at a time over long hauls and permits the same containers to be used on inter-departmental handlings. Note the special trailer hitch. (Lewis-Sheppard.)

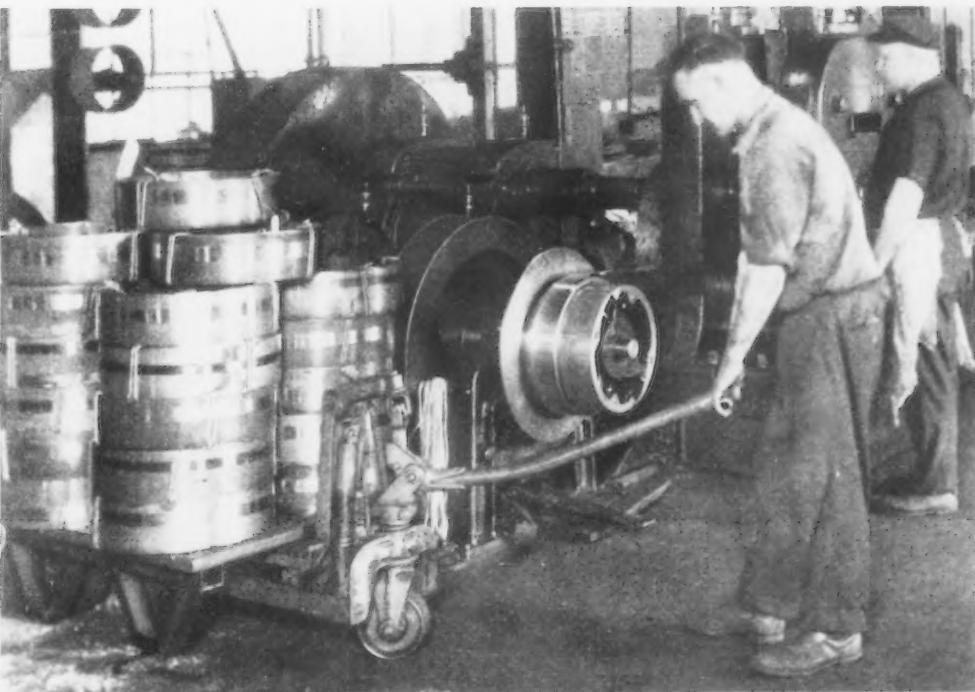
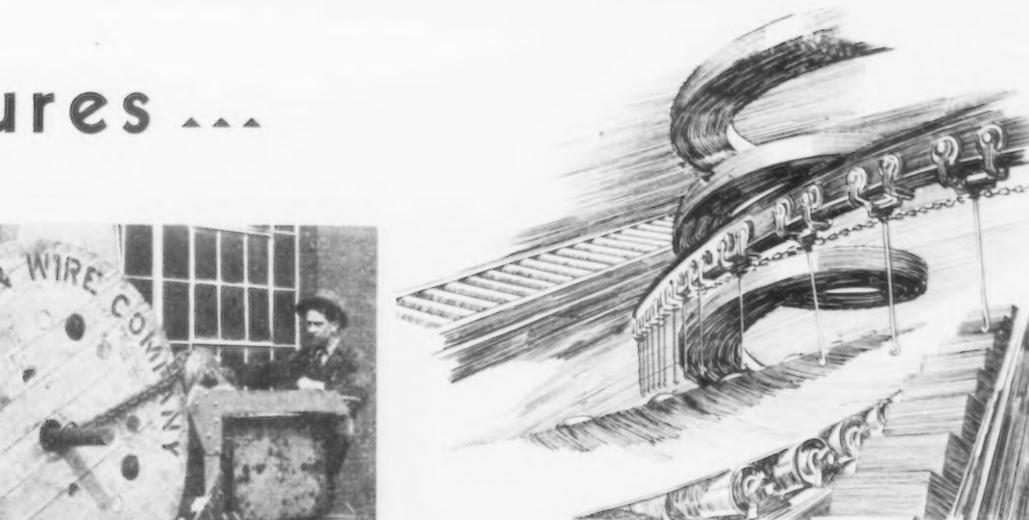
IN the handling of reels, rolls of bolting, and similar loads it is sometimes necessary to load them on to trailers or trucks. Here is a novel method to use so that the tractor operator can perform the operation without calling for assistance. (Mercury Manufacturing Co.)



reas In Pictures ...



THE operation of this truck is self explanatory. At left you will see a hand lift truck for performing the handling of similar reels. When to use the hand type and when to use the power type can easily be determined by the weight of the load and the quantity to be handled within a given period of time. (Automatic Transportation Co.)

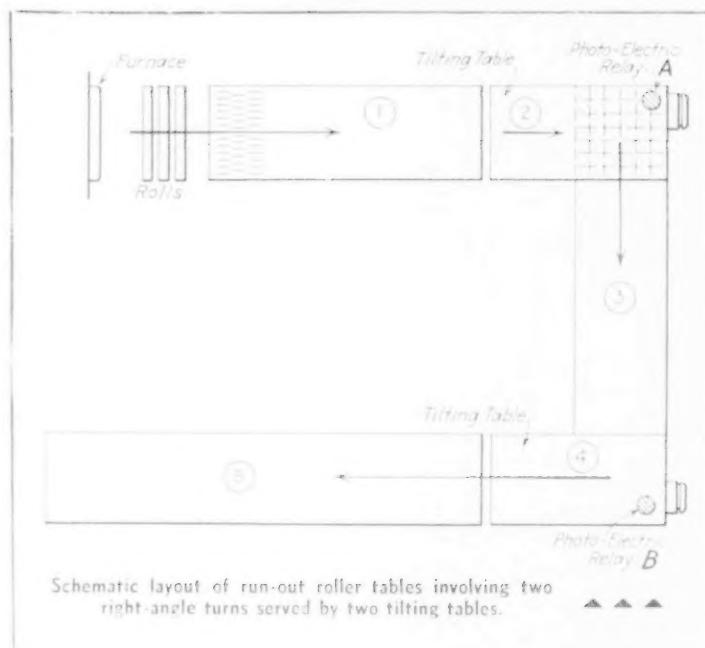


LOCOMOTIVE cranes have broadened their field of usefulness by adopting the caterpillar truck mounting. They are no longer limited to areas served by railroad sidings or special track layouts. This one with a peculiar boom is used for unloading and stacking poles in storage yard. (Pawling & Harnischfeger.)

WITH this hand lift truck rolls of strip steel are handled direct from the winding machine to the shipping platform without rehandling. A load of 5000 lbs. can easily be handled by one man. (Lewis-Sheppard.)

NEW ELECTRONIC T

By RAYMOND FRANCIS YATES
Member, Institute Radio Engineers



SEVERAL new and interesting applications for photo-electric cells have been found in the steel industry. These cells have great value in operating limiting devices. They eliminate mechanical devices with their attendant wear and need of adjustment. An instance of such application was in connection with a Mesta rolling mill, which had been equipped with photo-electric limit switches operating in conjunction with thyratron tubes.

Another limit switch application, in connection with run-out tables from normalizing and annealing furnaces, has been made by the Worth Steel Co., Claymont, Del. In this case the photo-electric tube did yeoman service, for the sheets coming from the furnace were of a particularly thin nature and the construction of mechanical limit switches would have been somewhat of a real problem. Still another factor had to be contended with, and that was the limitation of space, which made it necessary to build the table in a U-shape instead of permitting the sheet to run out in a straight line.

Two photo-electric cells are used on this table, one at *A* and one at *B*. Sheets leaving the first table (1) and reaching table 2 act to cut off the normal light source reaching the photo-electric cell *A*, and this in turn trips an electric relay. This relay stops the driving motors and rolls of the run-out table 1 and tilting tables 2 and 4; it also initiates the tilting action of tables 2 and 4. These tables tilt until their rollers are well below the level of the cross-over table 3, and they are stopped in this position by a limit switch.

If the reader has followed this action, he will be aware that the sheet under treatment now rests on the table 3 and is clear of the rolls on table 2. This same limit switch now starts the roller motors of the table 3 and moves the sheets away from the intersection of tables 2 and 3. The same action follows in removing sheets from the intersection of tables 3 and 4.

In this installation the run-out table 4, as well as the rest of the tables, are large enough to accommodate two sheets of the size handled, and the mill will not function automatically unless two sheets are handled at one time. Before the equipment becomes fully automatic two sheets must reach the cross-over table 3. To do this the operator turns off the light source for the photo-relays until the two sheets reach their proper position.

Two sheets having now been located on the cross-over table 3 between the tilting tables 2 and 4, the transfer of the third sheet on to table 3 and the movement of table 3 sufficiently to clear the crossing of tables 2 and 3, places a sheet between the photo-cell

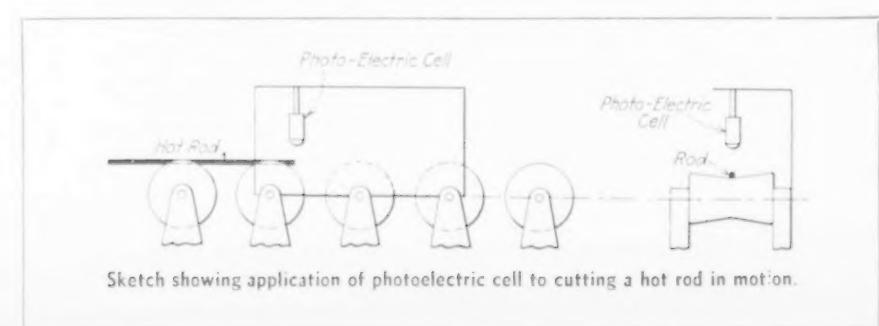
and its light source on the table 4. This relay, in turn, stops the cross-over table motors and starts the tilting table lift motor and brings the rollers of the tilting tables to a position above the cross-over rollers.

When this happens another limit switch stops the tilting tables in this position and starts the roller motors of tables 1, 2 and 4. The sheet resting on table 4 then runs out on table 5 to the shears and the entire cycle repeats itself.

Still another interesting and practical application of the photo-electric tube has been made by the Bethlehem Steel Co. in connection with cutting steel rods. A glance at the sketch will help the reader to fix the details of this system in his mind. A photo-electric cell is located above the red-hot bar as it moves along the rollers of the run-out table at a rate of about 1200 ft. a minute. The end of the hot bar under the photo-cell sets up a very weak current in the tube, which is amplified by a series of ordinary vacuum tubes.

This highly amplified current sets up a series of operations that eventually cuts the passing rods into their proper lengths. First, a large relay closes and establishes a 220-volt circuit. This circuit closes two larger relays, one of which starts the motor on the cutting shear. By the time the cutting shear has been started, the rod has run a predetermined distance and is ready for this operation.

In the meantime the second relay, which has been actuated by the 220-



TUBE APPLICATIONS



IN THE STEEL INDUSTRY

APPLICATIONS follow each other in rapid succession in connection with the use of various types of photo-electric tubes in industry. This article, following up a series of three published last year, goes into detail in regard to two of these applications, one in handling sheets from a normalizing furnace and the other in cutting hot rods to predetermined length.

radiation than any other known device. The current through the cell depends upon the amount of light striking it, and varies with the brightness of the surface being measured. Since the radiation from a heated body varies much faster than its internal temperature, it will be seen that the photo-electric cell is able to anticipate temperature changes.

The current generated by the photo-electric cell is amplified by a series

of vacuum tubes and recorded on a meter calibrated in terms of temperature units. The output current from the photo-electric cell amplifier also operates a thyratron tube, which acts as a sensitive relay to control the supply of fuel to the furnace.

This photo-electric pyrometer and automatic control will function on temperatures as low as 1000 deg. F. There is no limit to the higher temperatures that may be measured.

Water-cooled Skids in Billet Heating Furnaces

IN the earlier billet heating furnaces the water-cooled skids were usually supported by the hearth, brick walls or piers. They entered either as single pipe through the hearth, leaving the furnace at the inlet door, or two pipes were used, one lying in the center of an outer pipe, with the water in the space between the pipes.

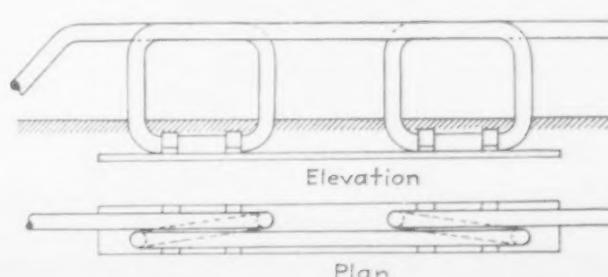
The attempt was made to lengthen the life of the skids through strengthening the top surfaces, by welding on square or round bars. These methods were sometimes unsuccessful, especially in the hottest part of the furnace, where the skids soon warped. The disadvantage of this design was the fact that, whenever the pipes were laid on the hearth, the space between the pipes was soon filled with scale, so that the flames could not get under the blooms or billets. In case walls or piers were used, these were soon destroyed by scale running off from the blooms, especially in the hottest part of the furnace.

All these disadvantages are eliminated by the use of skids with water-cooled supports, according to the design of Friedrich Siemens A.G., Berlin, here shown. The skids

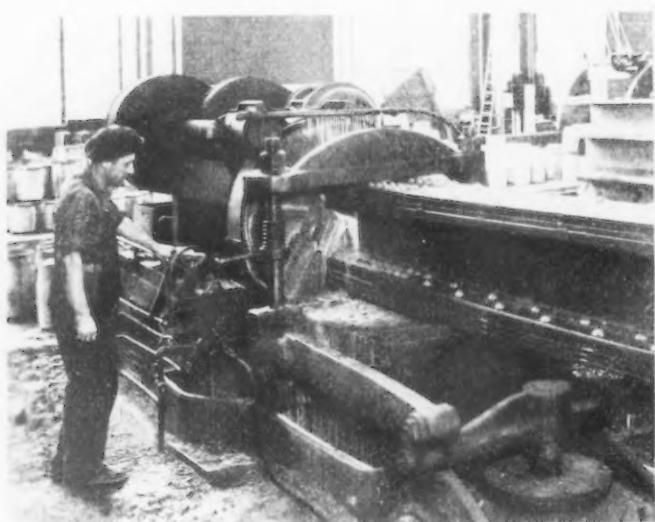
and cooling pipes are bent once or several times and the resulting loops form at the same time the supports of the skids. The pipes are solidly built in the furnace bottom, and can therefore not readily be replaced or turned over. Hence a round or square bar is welded on the surface as before. In case this bar has been worn off, it can be renewed at shutdowns.

Many furnaces are now being equipped in this manner and the life of the pipe has been raised to 150,000 tons of blooms or billets. The life depends essentially on the uniform cooling of the pipes. The temperature of the waste water should not exceed 120 to 140 deg. F. to avoid incrustation in the pipes. The required pressure is 28 to 42 lb. to the square inch and the consumption of water for the larger furnaces is 280 to 350 cu. ft. an hour.

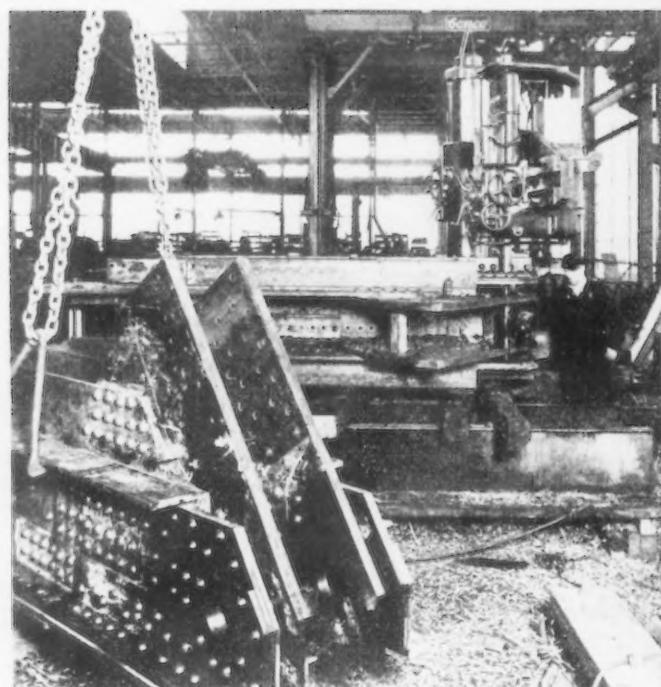
Translated by H. Illies, Amberg, Opt., Germany, from an article by Arthur Sprenger, *Stahl und Eisen*.



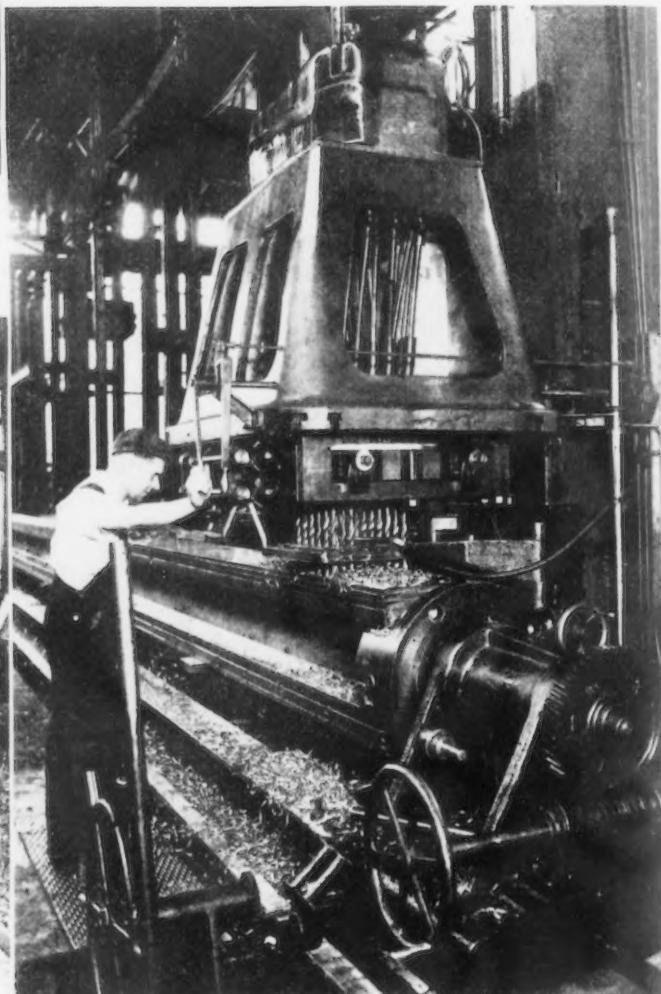
Fabricating the Steel for Cincinnati's New Union Railway Terminal



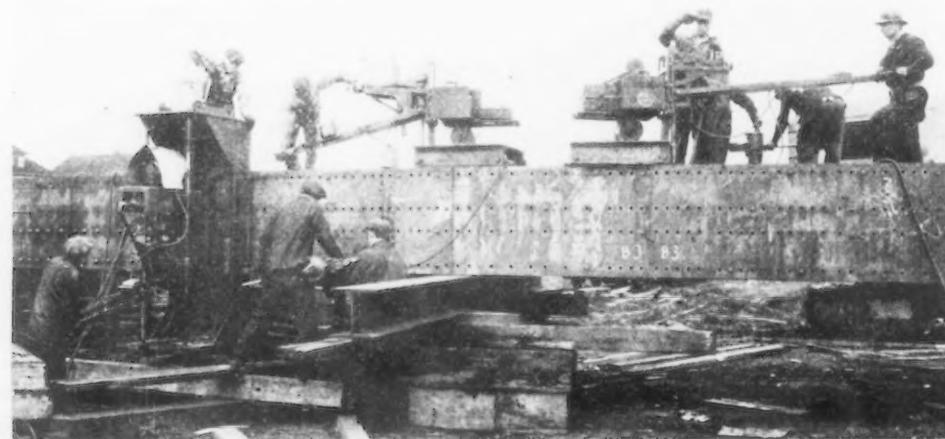
Milling the ends of the steel columns.



TRUSS bearings consisted of 6-in. solid steel pivot pins with which the trusses were secured to the tops of heavy supporting columns.

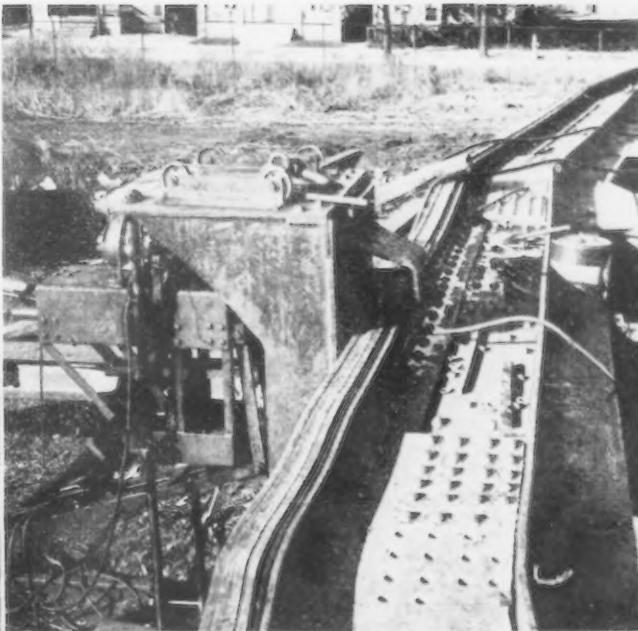


DRILLING rivet holes through the columns which have welded steel cover plates.



▲ ▲ ▲
EACH truss was fabricated in sections, assembled, checked and reamed in position, to insure perfect alignment of rivet holes, before being shipped. An inch and a quarter rivets were used in chords having a 7-in. grip, necessitating power-driven reamers and other special equipment.
▼ ▼ ▼

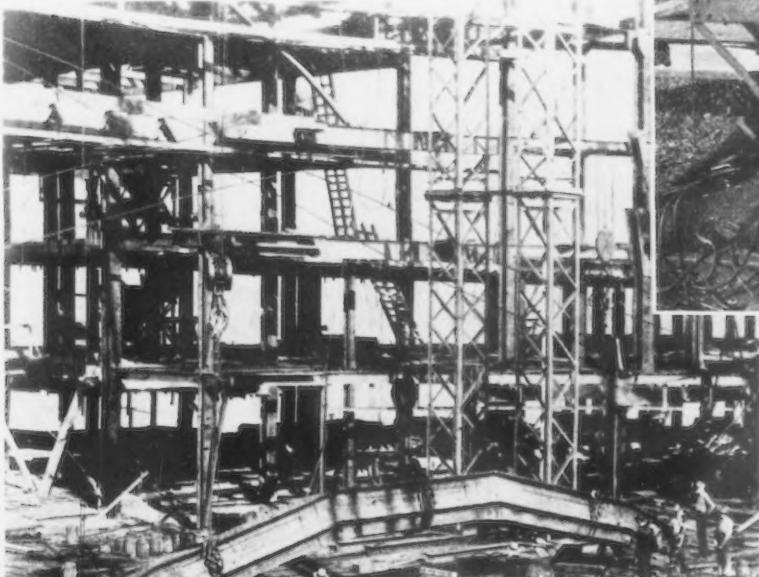
THE new railway passenger building, which is a part of the \$42,000,000 terminal improvement program at Cincinnati, is an interesting study in structural steel design. The building is 1000 ft. long, 550 ft. wide and 125 ft. above grade. The fabricating contract, calling for 25,000 tons of steel, was let to the R. C. Mahon Co., Detroit. Fabrication started May 1 and steel for the passenger and express buildings was completed Dec. 1.



A CLOSE view of the special reamer at work. This device proved to be accurate, easy to handle and economical.

* * *

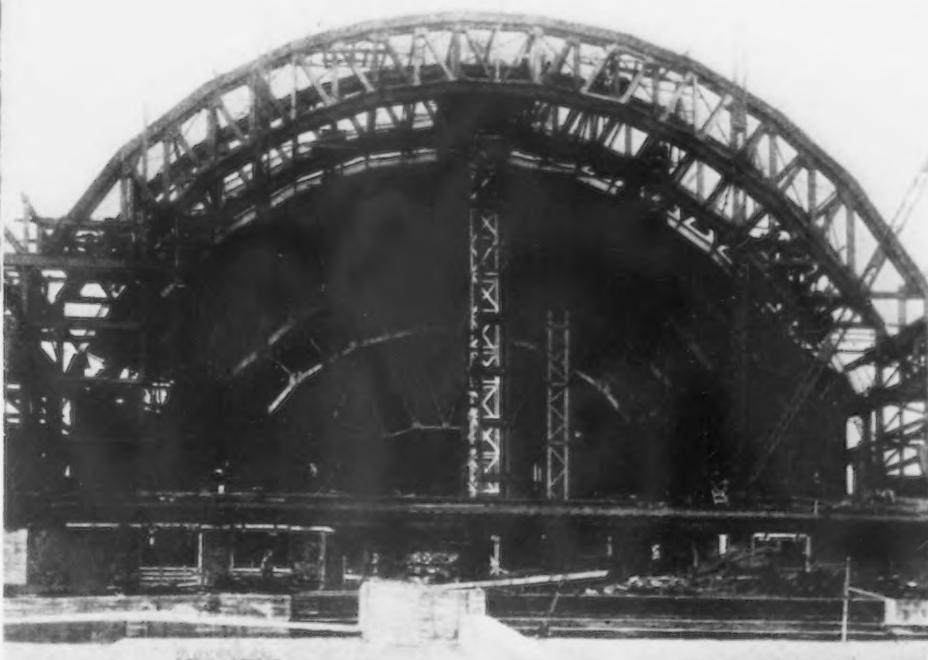
THE half dome on the passenger building consists of eight semi-circular trusses increasing in size up to 200 ft. clear span and a weight of 380 tons. This is believed to be the heaviest steel truss ever used in this country.



A SECTION of the arch trusses being raised during erection. These sections weigh 40 tons each.

* * *

A TRUSS assembled for reaming before shipment.



FORGED AND ALLOY MALLEABLE IRON

By FRED B. RIGGAN

Metallurgist, Birmingham, Ala.

THE engineering world today is constantly demanding new materials that will give a more satisfactory performance in highly specialized applications. Not only are these applications legion but the severity of demand is taxing the capabilities of the foundry and steel plant metallurgists. These new demands are evinced by the many new specifications added or altered each year. The cast iron foundries, with their semi-steel, high-test and alloy irons of various trade names, show some of the activities of the foundry metallurgist in answering these urgent and exacting demands of the engineer. New alloy steels, too numerous to mention, are being developed by special research groups to meet certain specific requirements. Typical demands are strength with minimum weight, resistance to corrosion and strength at high temperature.

Formerly, operating under the old industrial axiom that it costs less to make things alike than to make them different, the ultimate consumer had to be satisfied with a material that was produced to satisfy so far as possible varying conditions of service.

The consumer, whose needs are more and more exacting, is now demanding a product that will suit his own particular requirements to the nth degree. This necessitates a peculiar and individual attention to the production of his castings. These

new developments led to the preparation of a special symposium at the spring meeting of the American Society for Testing Materials for a better understanding of the requirements of both producer and consumer.

Some very interesting experiments on special properties of malleable iron were conducted by E. K. Smith in 1923, which were reported in the *Proceedings* of the American Foundrymen's Association of that year. In his paper he mentioned hardened and tempered malleable castings showing tensile strengths up to 143,000 lb. per sq. in. Some of his bars of around 100,000 lb. per sq. in. gave an elongation of 8 per cent. Since the publication of that paper, the author of this article has had his attention called many times to other properties of this metal.

Malleable cast iron, although containing 2 per cent or more of total carbon, is in reality a very low-

carbon, relatively low-silicon iron mechanically mixed with temper carbon, much the same as wrought iron is mixed with slag. This similarity is further emphasized in some of the photomicrographs here shown.

The ease with which malleable iron can be forged (below critical temperature) brings up the possibilities of casting certain intricate castings and finishing them as a forging after they have been annealed. The writer has forged bolts and bars of annealed malleable, made in the regular process, which gave considerably over 100,000 lb. per sq. in. tensile strength, with elongation up to 5 per cent.

Figs. 1, 2 and 3 show normal and forged malleable. Fig. 2 is a section parallel to the axis of a bar forged from 4 in. to 7.5 in. long (100 diameters.)

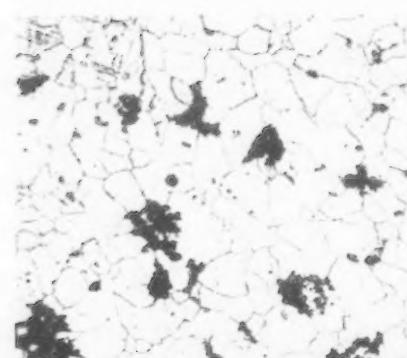


Fig. 1.—Normal malleable iron. (100 diameters.)

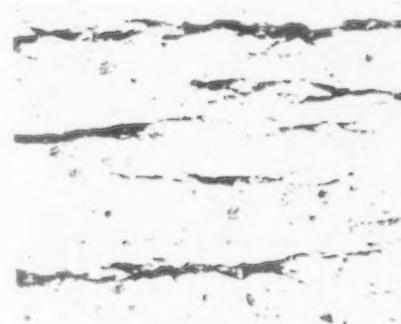


Fig. 2.—Section of forged malleable iron, parallel to the axis of a bar forged from 4 in. to 7.5 in. long (100 diameters.)

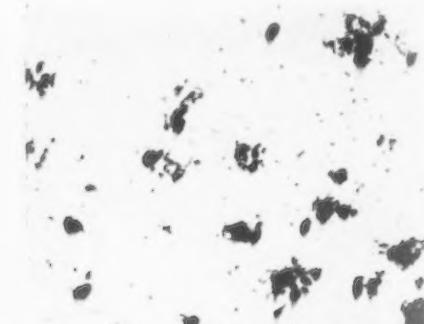


Fig. 3.—Cross section of metal in Fig. 2, perpendicular to the axis. (100 diameters.)

Table I—Properties of Normal and Forged Malleable Irons

	Regular 4-In. Bar	Forged to 10-In. Length	Forged to 9-In. Length	Forged to 8-In. Length	High Silicon 8-In. Length	Low Silicon 8-In. Length
Tensile, lb. per sq. in....	49,000	105,000	101,000	97,600	95,000	100,500
Yield point, lb. per sq. in....	35,000	78,100	69,200	49,500	58,000	69,000
Elongation, per cent.....	11.0	3.00	3.50	4.50	4.00	5.00
Brinell No.....	137	202	207	212	228	224

BLE IRON FOR SPECIAL USES

EXPERIMENTS by the author indicate that a wider field for malleable iron can be opened up by forging the castings and by introducing alloys.

Forged malleable has relatively high physical properties and is desirable for making intricate shapes and for producing castings in which one part must have high strength and another part must have the ordinary characteristics of malleable iron.

Alloy malleable containing copper and molybdenum possesses superior anti-corrosive properties for certain uses.

in. and an elongation of 7 per cent. Fig. 3 shows a cross-section of this bar perpendicular to the axis. Fig. 4 is a piece of wrought iron shown for comparison with Fig. 2. The similarity in appearance between the oriented temper carbon and the slag in wrought iron is very striking. Table I gives results on duplicate bars that were forged out to different lengths.

Alloy malleable, when molten, is far more fluid than steel and can be cast into any desired shape, even where the wall thickness is as low as 1/16 in. Its very smooth surface contributes not only to its attractive-

ness but is a great factor in its resistance to corrosion.

Below are some short-time tests showing comparison of the corrosion-resisting properties of alloy malleable, alloy gray iron and alloy steel in acid, all containing equal amounts of the same alloys. In these data are given the same irons without alloys. The alloys used are copper under 1 per cent and molybdenum under 0.10 per cent. Sulphuric acid, 20 per cent, was used in this test and corrosion is expressed in loss in grams per 100 sq. cm. in 22 hr.:

Gray iron with alloy.....	5.05
Malleable iron with alloy.....	0.95

Steel with alloy.....	0.64
Gray iron without alloy.....	18.16
Malleable iron without alloy.....	11.13
Steel without alloy.....	7.74

In very weak sulphuric acids (under 1 per cent), the alloy malleable is better than the alloy steel. The alloy malleable is good in most alkaline conditions.

Fig. 5 is a cross-section (at 8 diameters) of the threads of an alloy malleable casting. Fig. 6 is same of regular malleable. These castings were submerged in a 0.5 per cent sulphuric acid solution for one month. The threads of the alloy casting were hardly damaged.

Comparison of the corrosion resistance of varying amounts of the same alloys in malleable with unalloyed gray iron and malleable in aerated tap water is given in Table II.

Indications are that a useful field for forged malleable would be in the production of a casting, one part of which must have high strength and still another part the ordinary properties of good malleable iron.

Uses of alloy malleable might include service in salt water, acid and sludge, mine water, stoves, alkaline soils, household and industrial installations where the water is unusually hard.

The author is not aware of any work that has been done on forging malleable or any particular attempts to make a more corrosion-resistant alloy malleable. This fact, together with what experimental data the author has been able to accumulate shows, in the writer's opinion, a wide field for research and a possibility of commercial application.



Fig. 4.—Wrought iron for comparison with malleable in Fig. 2. (100 diameters.)

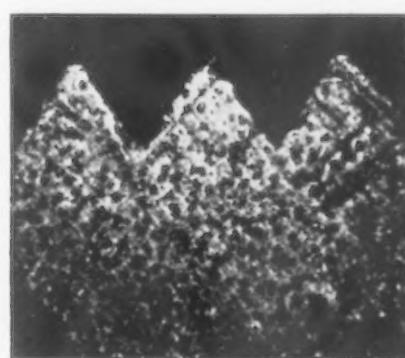


Fig. 5.—Cross section of the threads of an alloy malleable casting. (5 diameters.)

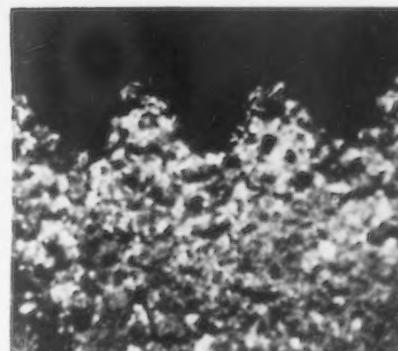
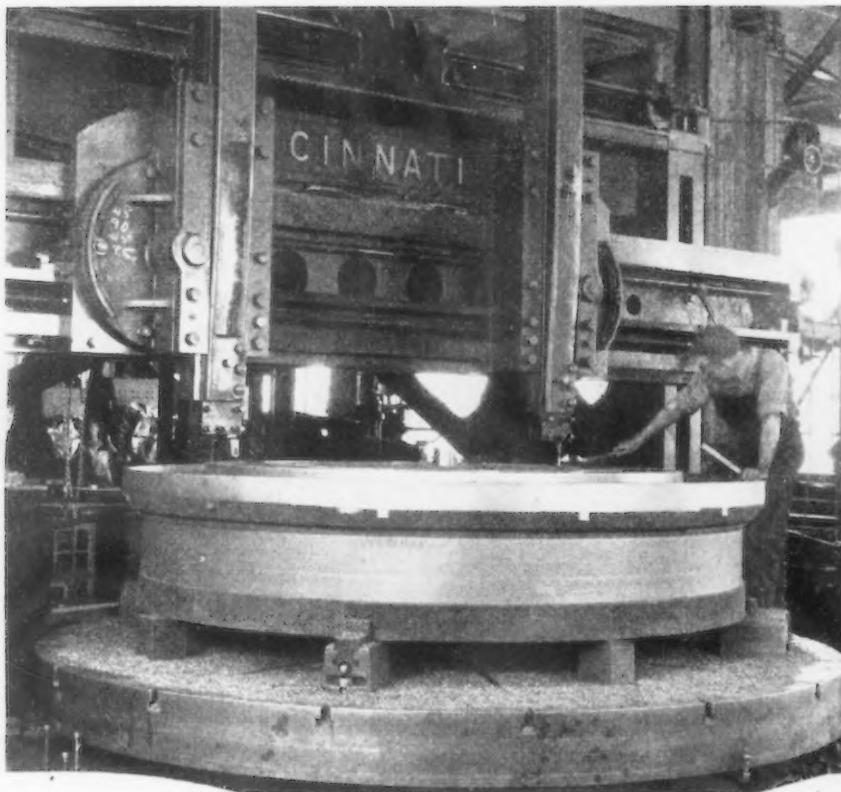


Fig. 6.—Same as Fig. 5, but regular malleable iron. (5 diameters.)

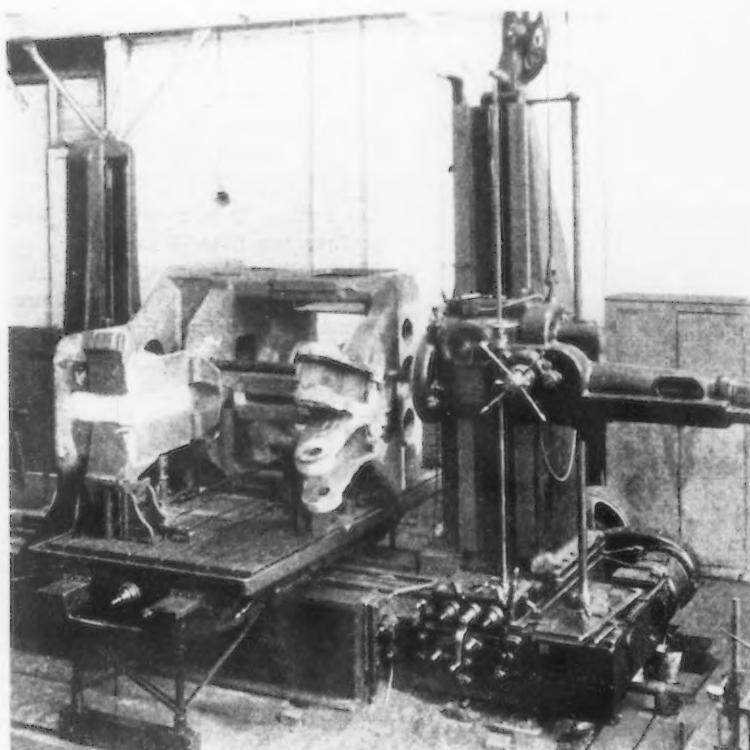
Table II—Comparative Corrosion in Aerated Tap Water

	Copper, Per Cent	Molybdenum, Per Cent	Time, 40 Days	Time, 60 Days	Time, 136 Days
Malleable.....	none	none	2.68	4.45	5.88
Gray iron.....	none	none	2.49	4.57	6.08
Malleable.....	none	0.20	2.28	4.04	5.27
Malleable.....	0.31	0.04	1.91	4.03	5.30
Malleable.....	0.54	0.09	1.85	3.54	5.66
Malleable.....	0.54	none	2.19	3.95	5.15
Malleable.....	0.54	0.18	2.49	4.38	5.19
Malleable.....	0.59	0.06	2.18	3.96	4.58
Malleable.....	0.80	0.16	1.67	3.32	5.24
Malleable.....	0.92	0.19	1.85	3.60	4.90
Malleable.....	1.18	0.22	2.01	3.99	5.45

Building Special the Kent-



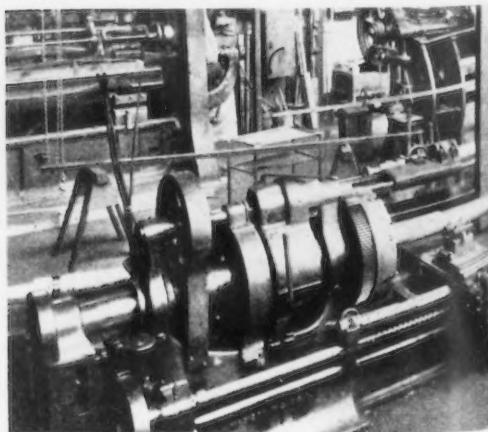
The lower bearing for a bottle machine, a casting weighing 7 tons, is machined on a 16-ft. boring mill. This single job takes 30 hr.



Machining work on this 6½-ft. semi-steel casting requires 10 days and nights, involving 11 separate setups, on the largest table-type boring mill in the world. The machining of the angular ears is an unusually difficult task. The table of the mill has an overall size of 5½ x 11 ft. and the head has an adjustment of 7 ft. Special saddle supports insure accuracy on heavy jobs or where the overhang may be great. This casting is part of an automatic welding machine.

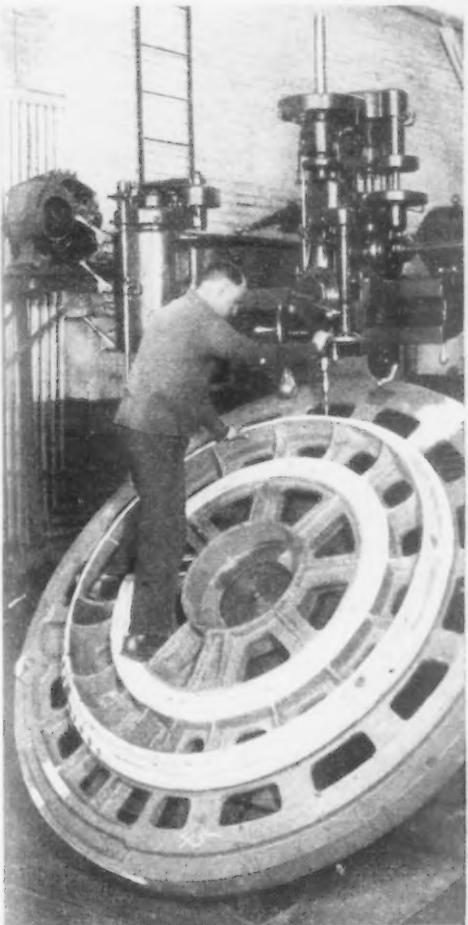


Drilling holes in the base for a large revolving glass tank 11 ft. in diameter.

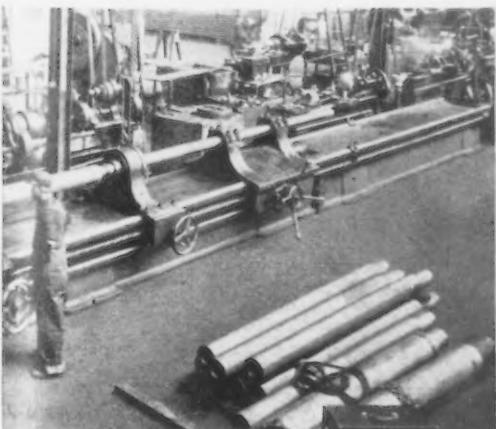


Paper mill and glass making rolls are turned 40 ft.

Machinery at Owens Plant

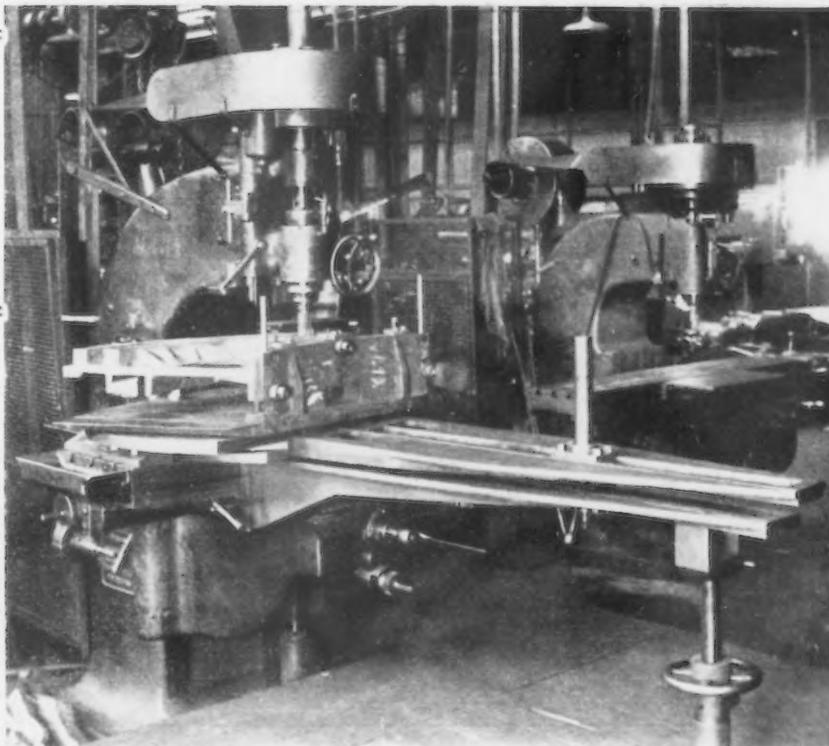


A large casting placed at an unusual angle for a drilling operation.

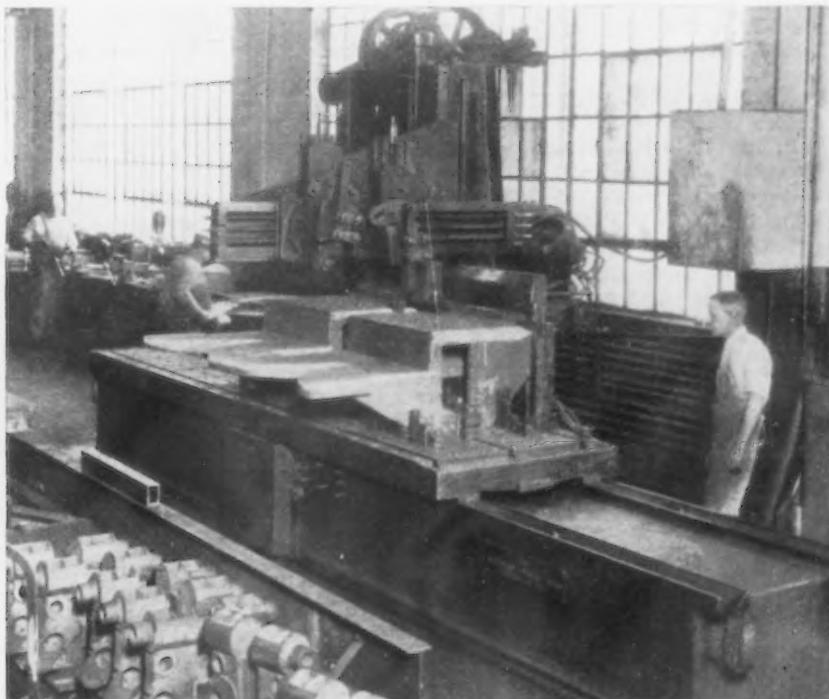


are turned
40 ft.

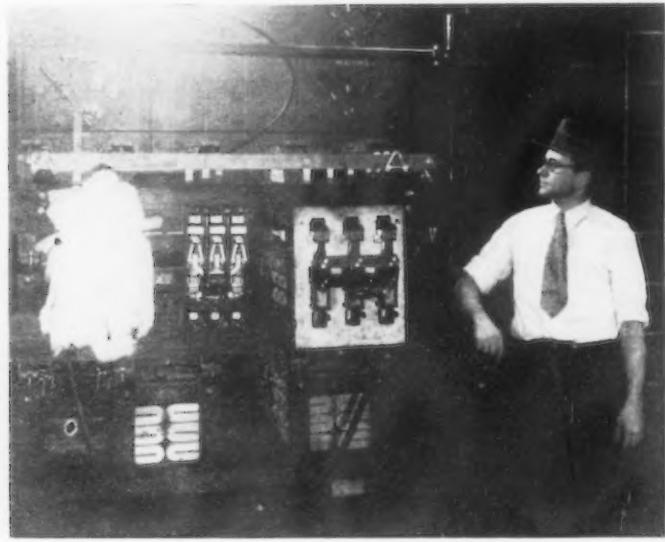
and bored on a gun lathe which has a bed long.



The size of work which can be handled on this drill has been increased by attaching to the machine a radius support designed by Kent-Owens engineers.



Planing two castings for wire wheel riveting machines. At left is the radius support for large work.



In a recent demonstration, 10,000 amp. at 600 volts were interrupted by a 225-amp. AB De-ion circuit breaker without even singeing the cotton batting wrapped around the device shown in the illustration. Ten thousand amp. at 600 volts applied to arcing horns made the flash shown at the upper left of the picture.

Improved Circuit Protection Offered by Westinghouse

FOR circuit protection in industrial plants, mines, buildings, homes, etc., the Westinghouse Electric & Mfg. Co., East Pittsburgh, is offering a flashless device known as the AB De-ion circuit breaker, which is believed to have a number of advantages over fuses and carbon circuit breakers. Unlike a fuse, the De-ion breaker has nothing to be replaced or renewed, and can be reclosed as quickly and easily as a switch. It cannot be held closed against an abnormal overload or short circuit; it cannot be blocked to prevent opening the circuit, and its rating cannot be changed by unauthorized persons. It also has a time lag, preventing unnecessary tripping on slight, momentary overloads.

The De-ion breaker requires only about 70 per cent as much mounting space as a carbon breaker, and opens a short circuit without flash or undue noise. It is so inclosed in a molded composition box that no live parts are exposed. A handle that protrudes through the cover provides for manual operation and for reclosing the breaker after it has been tripped.

The operating mechanism is arranged to provide quick make and quick break. The contacts, which are trip free of the handle, are held in the closed position by a toggle composed of two sets of links, one of which is fulcrumed to the contact mechanism, and the other placed on a cradle beam pivoted on the frame at one end and latched to the trip mechanism on the other. The trip mechan-

ism consists of a bi-metal thermal unit calibrated to trip at 125 per cent overload. On breakers of 50 amp. or more an additional trip of the magnetic type trips the breaker instantly on short circuits. Upon being released by the trip mechanism, the cradle beam moves, permitting the toggle linkage to break and the contacts to open at high speed. When the contacts open the arc is drawn through a series of small parallel plates $\frac{1}{16}$ in. apart. Between the plates a radial magnetic field is created by a nearby coil. The arc creates another magnetic field which moves the arc into the radial field. The plates absorb so many free ions that the arc is destroyed.

In factories and buildings, the De-ion circuit breaker is offered as replacing fused knife switches, safety switches and carbon breakers, for motor circuits and general light and power distribution. As a replacement for safety switches it is mounted in a steel inclosure. The case and the operating handle covers are hinged, and can be locked to prevent operation by unauthorized persons. A small red indicating neon lamp shows when the breaker is closed.

Use of these circuit breakers reduces the size of switchboards. A 600-amp. De-ion breaker occupies a space $8\frac{1}{4}$ in. wide, while a 600-amp. carbon breaker requires a space 22 in. wide. The 15 to 50-amp. breakers for use in the home, will be available in one, two and three-pole combinations, 125 and 250 volts. The 55 to

600-amp. breakers will be available in two and three-pole combinations up to 575 volts. These breakers will be inspected and labelled by Underwriters' Laboratories.

Used on Runout Table Drive

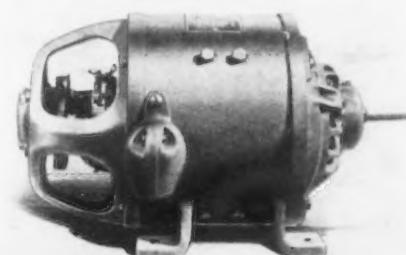
An example of the value of the accuracy of calibration of De-ion breakers combined with their proper timing, is cited in connection with the individual roll drive on a runout table in a steel mill. On such applications the breakers, though they cannot be used as motor starters, can quite often be set so close to the proper current value that with their timing feature they can provide branch line protection for individual motors in some cases, thus reducing the number of idle motors on any one outage. It is pointed out that in such applications the replacement cost of fuses, including labor of replacement, is quite high as compared with other industries, so that the economy of the De-ion breaker becomes of increasing value.

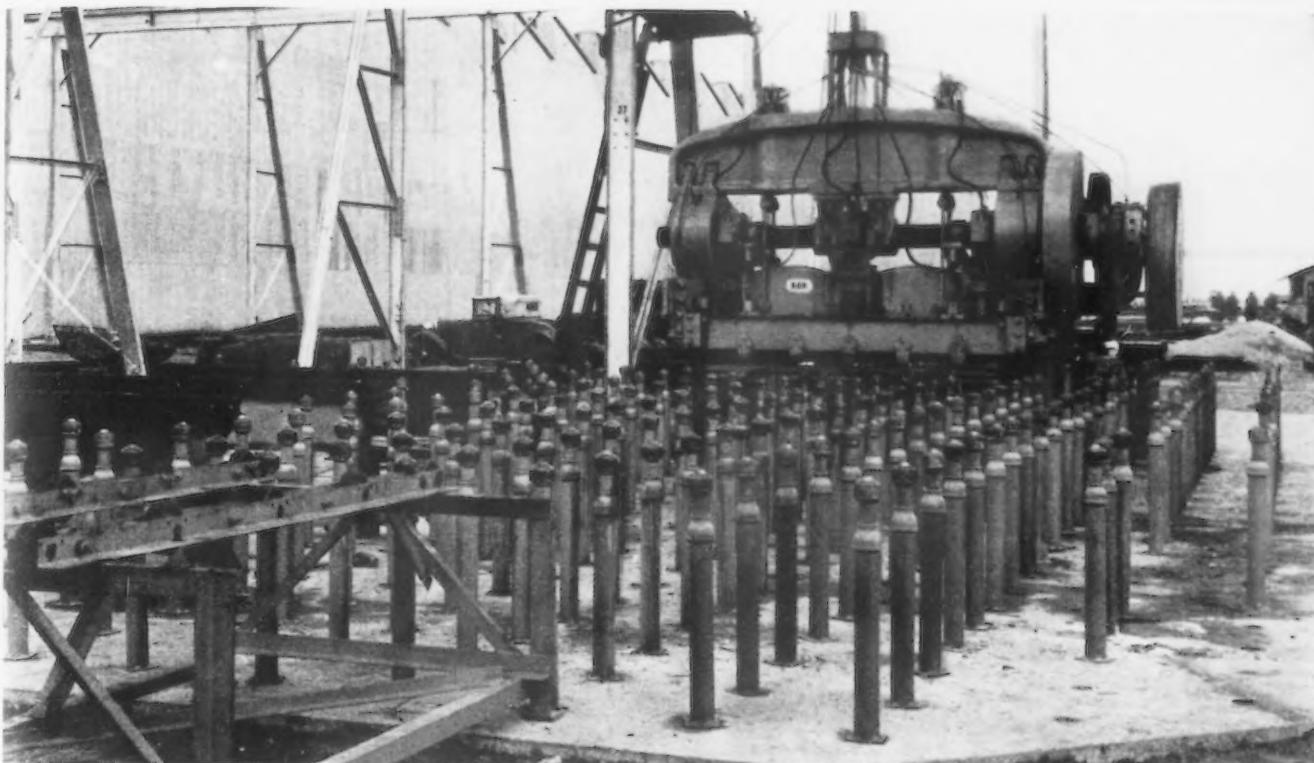
Savings due to the use of these breakers are illustrated also by a typical operation in a large automobile works, where outages of any one of hundreds of machines in a production line are serious. Present practice to avoid such losses results, it is pointed out, in a heavy investment in fuses, which in many plants amounts to thousands of dollars a month.

Small Direct-Current Motors

DIRECT-CURRENT motors in sizes from $\frac{1}{2}$ to 3 hp., 1750-r.p.m., for constant or adjustable-speed operation, comprise a new line placed on the market by the Reliance Electric & Engineering Co., Cleveland, Ohio. They are provided with either ball or sleeve bearings and may be had in either the open, semi-inclosed or fully inclosed constructions.

The motors are rigidly constructed to withstand hard service. Windings are finished in bright orange enamel to facilitate detecting dirt, and an unusual feature for small motors is the refillable type commutator, the copper bars of which may be easily removed and replaced when worn or damaged. Another feature is the use of two brushes per stud; this is emphasized as improving commutation and keeping these power units running longer and steadier, with less attention.





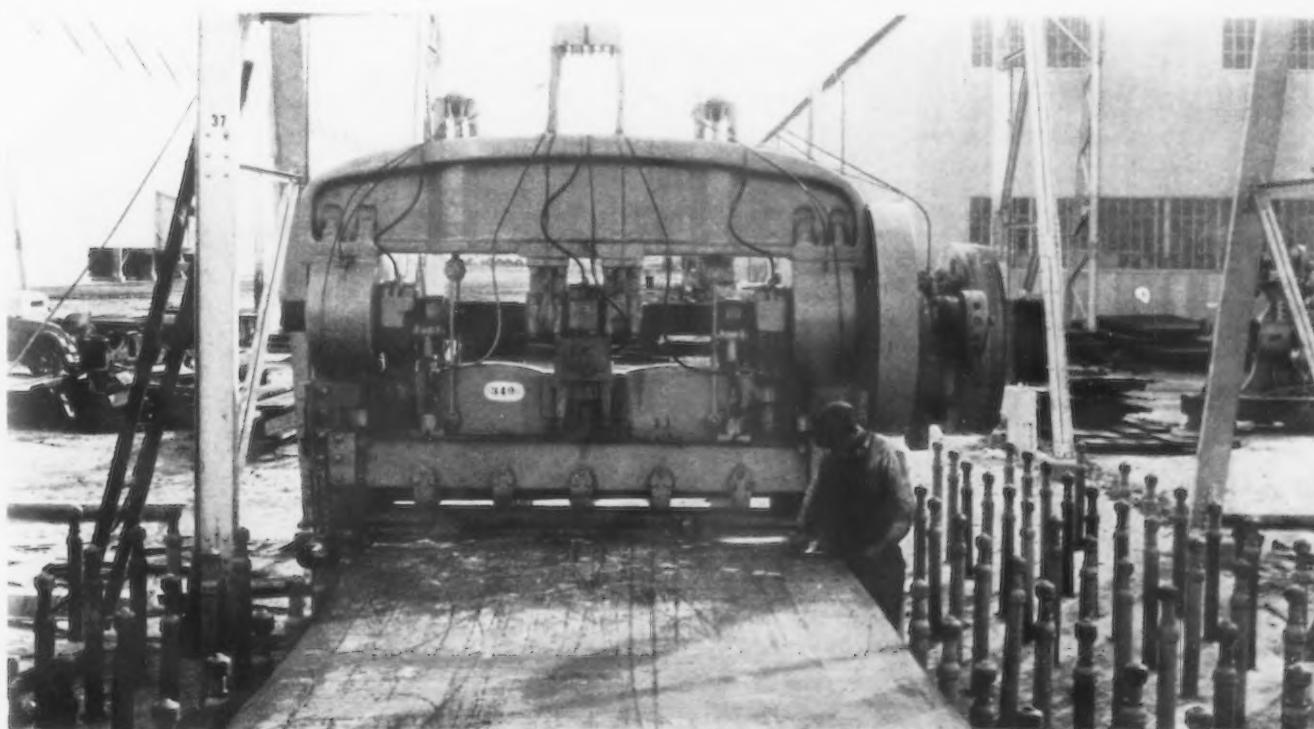
Ball Conveyor for Plates

THIS unusual and effective conveyor installation is from the new plant of Consolidated Steel Corp., Ltd., of Los Angeles. Projecting through the cap of each standard is a large free rolling steel ball which rests upon smaller balls contained within the cap. As shown

in the illustration above, the standards are mounted in concrete and so spaced that the machine operator can move between them readily.

Plates of any size or weight may be handled with a minimum of effort and moved or turned in any direction. While this particular installa-

tion is for the service of one machine, the possibility of minimizing handling on successive punching or shearing operations, by grouping machines about such a transfer field, will be recognized. The installation shown was made by the Mathews Conveyor Co., of Ellwood City, Pa.



Tools Tipped with Armide, a New Carbide Alloy

CUTTERS tipped with Armide, a new carbide alloy, are being offered by Armstrong Bros. Tool Co., Chicago. This material has a hard-



ness of 88.5 to 90.5 (Rockwell "no load" C Scale) and a tensile strength of 250,000 lb. per sq. in. It is exceedingly hard and wear-resisting and at the same time it is tough. Its thermal conductivity is so low that it remains cool and securely brazed even though chips run red hot. The cutting edges of Armide are said not to

groove, nor will chips weld on the cutting edge.

These bits are designed for general use in Armstrong carbide tool holders and in other Armstrong tool holders. They are recommended by the manufacturer not only for the machining of such materials as glass, bakelite, synthetic plastics and hard rubber, etc., but for general cutting as well, including the machining of cast iron, tough alloy steel, hardened steel, hard and soft brass and aluminum and aluminum alloys. This carbide alloy is practically unaffected by commercial acids or alkalies. It is readily ground to form with special wheels as now furnished for this work by various grinding wheel manufacturers. These cutters come ground, ready for use, to five standard cutter forms. All forms are available on either "Flat" or "Square" bodies.

Automatic Combustion Indicator-Recorder

A NEW all-metal automatic flue gas analyzer known as the "Tag-Mono" indicator-recorder has been announced by the C. J. Tagliabue Mfg. Co., Brooklyn N. Y. This instrument not only indicates and records the percentage of CO₂, but also gives an accurate record of the percentage of combustibles, such as CO+H₂, which may be present in the flue gases.

The instrument is said to work on the orsat principle, analyzing chem-

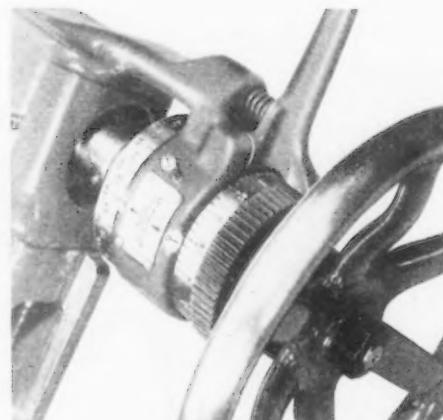


FLUE gas is analyzed chemically and indicated and recorded electrically. The dial is illuminated.

ically and indicating and recording electrically and is of simple design. The large illuminated dial and pointers can be seen easily at a distance of 30 ft. The records are made on a 9-in., 24-hr. circular chart with open graduations that permit precise study of the continuous performance curve.

New Back Gages for Cincinnati Shears

STANDARD equipment for the all-steel shears built by the Cincinnati Shaper Co., Cincinnati, now includes heavy ball-bearing direct-reading back gages having adjusting screws connected to work in unison.



DIRECT-READING dial graduated in inches and sixty-fourths, and use of anti-friction bearings feature this new back gage for Cincinnati shears

Arrangement of this new gage may be seen in the illustration. If the gage is aligned parallel with the knives, it maintains this alignment for all settings. One end of the straight-edge is adjustable outward, independent of the screw for taper cutting. The gage bar abuts a stop in the parallel position. All bevel gears are mounted on ball bearings. A direct-reading dial is graduated in inches and sixty-fourths. An automatic locking device locks the gage for any setting.

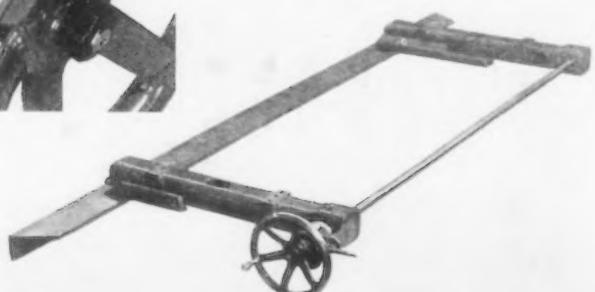
Announces Portable Recording Pyrometer

A PORTABLE electrically-driven recording pyrometer has been brought out by the Hoskins Mfg. Co., Detroit. The weight is 17 lb. The instrument permits of simple wall-



mounting, from which position it can be removed merely by lifting it off. Its chart is driven by a self-starting synchronous electric clock movement, assuring close accuracy, it is said, of the time element.

The chart is 8½ in. in diameter and provides a 24-hr. temperature record, which consists of a series of overlapping dots that are recorded every 30 sec. by the impress of a stylus against carbon paper back of the chart. The meter is equipped with automatic cold-end compensation and is calibrated for Chromel-Alumel thermo-couples.



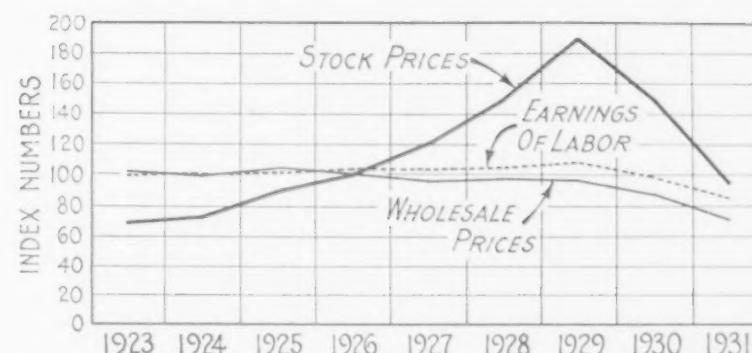
Industry Will Modernize to Finance Consumption

THIS depression will be remembered as marking a transition from old to new ideas of thrift and investment. During the long period in which America's chief concern was the conquest of the frontier, there was a shortage of capital and of capital goods. As fast as savings were accumulated and invested in railroads, mines, mills, factories and warehouses, new communities sprang up calling for additional capital.

After the World War, restriction of immigration and a slowing up of population growth largely cut off the old stimulus to business expansion. Industrial stagnation would doubtless have resulted but for two fortuitous circumstances. Deflation of wages was arrested by reduced immigration, and the rise of mass production cut costs and held down prices.

In the graph it will be noted that wholesale prices receded from 1925 to 1927, advanced slightly in 1928, and then resumed their decline. On the other hand, earnings of factory labor rose without interruption from 1923 to 1929. As wage earnings increased and prices ebbed, business volume and profits mounted. It was said that a "new era" had arrived and popular imagination was fired by the immense returns that seemed sure to come from the widening spread between commodity prices and consumer purchasing power. Savings flowed into the stock market and at length investment buying of securities degenerated into rampant speculation.

One result of the inflation of stock prices was the diversion of funds from industry and trade. For example, construction, which is especially sensitive to interest rates, reached its peak as early as 1928 and then went into a decline which has not yet been halted. Another result of the stock market boom was an acceleration of plant expansion without a compensating speeding up of consumption. A final outcome was the Wall Street panic, which ushered in not



A WIDENING spread between wage earnings and prices, in other words a rise in real wages, characterized the years of prosperity. Business flourished until it ran afoul of the stock market crash. Index numbers of wholesale prices (1926=100) are those of the Bureau of Labor Statistics. Weekly earnings of factory labor are represented by the index numbers of the National Industrial Conference Board (1926=100). The stock price index (1926=100) is that of Standard Statistics Co.

only a sharp deflation of stock prices, but a precipitous drop in commodity prices and employment.

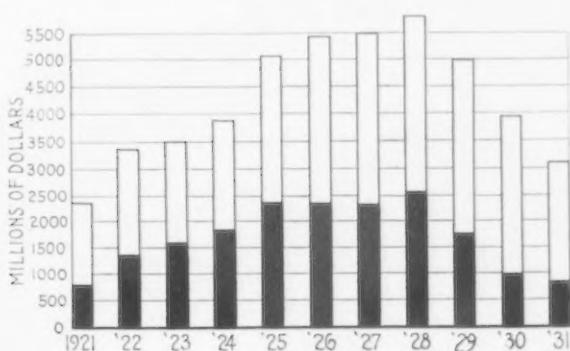
The sudden collapse of the new era did not, as many contend, prove the fallacy of its main tenet, i.e., that mechanization, cost reduction and rising real wages furnish the key to increased production and prosperity. Throughout the depression there has been much talk of interdependence. Industrial relations have been singularly peaceful. Wages have been cut reluctantly and employment has been spread as much as possible to reduce enforced idleness. What does all this mean, unless it be an appreciation of the paramount importance of the consumer in our economy?

Whether employers and employees are fully aware of it or not, they sense a community of interests that was absent in previous depressions. In earlier periods overexpansion merely meant waiting for population growth to catch up. Today it means waiting for average consumer purchasing power to catch up.

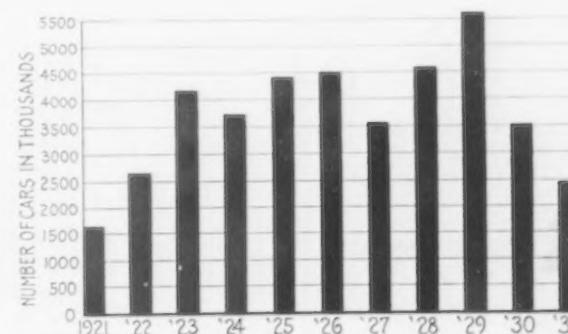
The leading role that consumer goods have taken in our industrial life is evident from a review of the

20's. Two outstanding causes of the prosperity of that period were building and automobile manufacture. Motor vehicles are mainly bought by consumers, while an important part of building construction is accounted for by residences. Radios, electric refrigerators and many other things which would have been considered luxuries before the war also contributed to business activity.

These products and new ones in process of development will doubtless help supply the stimulus that will pull us out of depression, for there is no question that conscious efforts to "capitalize" the consumer will form an increasingly important part of industrial programs in the future. An equilibrium between producer goods and consumer goods will be sought by a more intelligent allocation of earnings between plant on the one hand and stockholder, wage earner and consumer on the other. Blind expansion of plant will be avoided, but great emphasis will be placed on cost-reducing equipment and methods. In fact, modernization will be the chief reliance of industry for the savings necessary to finance consumption.



BUILDING, an important part of which is residential construction, figured prominently in the business growth of the 20's. The graph shows annual construction contracts in terms of value, residential building being indicated by the black portions of the columns.



THE automobile, a consumer good, was an outstanding support of business activity in the prosperity of the 20's. The chart shows annual production of motor vehicles in this country and Canada in the past decade.

Aggregate Net Loss in 1931 of 27 Steel Companies \$14,622,526

This Compares With a Profit of \$168,300,646 in 1930 for Identical Producers—Small Units Made Poorest Records

AGGREGATE net loss during 1931 of 27 companies engaged in the production and rolling of steel amounted to \$14,622,526, compared with a profit in 1930 of \$168,300,646. The companies included, as shown in the accompanying table, account for at least 95 per cent of the country's steel-making capacity, and of that number only 10 reported a profit.

In the preceding year 18 of these companies were able to show profits, after all charges, and with one exception, losses were confined to the smaller units. The 1931 profits also included a special non-recurring income of \$19,341,659, reported by the United States Steel Corp., which can hardly be considered profit from operations. If this figure were to be included in the comparisons for last year, net loss would amount to \$33,964,185. Only four of the industry's 10 major companies reported profits for the year, and two of these, the United States Steel Corp. and the Bethlehem Steel Corp., fell far short of earning their preferred dividends. In the preceding year only one of these major producers reported a deficit, and many of the others earned a fair return on their common stocks.

Generally speaking, the smaller units engaged principally in the production of flat-rolled products made the poorest records. Exceptions must be made in the case of the McKeesport Tin Plate Co., which produces only tin plate, and the Granite City Steel Co., which also has a large tin plate capacity. This might indicate

that tin plate was practically the only finished steel commodity which was made profitably during the year. But the comparisons show that large companies, such as Republic Steel Corp., and Youngstown Sheet & Tube Co., reported the greatest deficits in the list. In no case was a better showing made in 1931 than in 1930.

Welding Society Plans Comprehensive Meeting

More than 20 papers will be presented at the five technical sessions of the annual meeting of the American Welding Society, which will be held April 27-29 at the Engineering Societies Building, New York. The regular annual meeting of the American Bureau of Welding, the research department of the society, will be held the afternoon of April 29. The program of technical sessions is as follows:

APRIL 27, A. M., SHIPBUILDING: Welding in the Construction of U. S. S. New Orleans, by Capt. J. O. Grawne, United States Navy; Experimental Determination of Stresses in Fillet Welds, by L. C. Bibber, Bureau of construction and repair, Navy Department; and Welded Barge Construction, by G. G. Holbrook, Federal Shipbuilding & Dry Dock Co.

APRIL 27, P. M.: A Study of the Transformation Points of Fusion Weld Metal, by E. R. Hensel and E. L. Larsen, research laboratories, Westinghouse Electric & Mfg. Co.; Cause and Cure of Intercrystalline Corrosion in Austenitic Steels, by Dr. John A. Mathews,

vice-president, Crucible Steel Co. of America; Welding Duralumin, by H. S. George, research engineer, Union Carbide & Carbon Research Laboratories; and Welding Wrought Iron Pipe, by James Aston, A. M. Byers & Co.

APRIL 28, A. M.: Spot Welding, by Mr. Robertson, Fleetwings, Inc.; Arc, Gas and Resistance Welding of Pressure Vessels, by H. LeR. Whitney, M. W. Kellogg Co.; Production Welding of Light Gage Metal Specialties, by representative of Servel Co.; and Welding of Extruded Metal, by I. T. Hook, research engineer, American Brass Co.

APRIL 28, P. M.: Symposium on ductility in welds, with papers by Dr. C. A. Adams, Harvard University; E. Chapman, Lukeweld, Inc.; E. R. Fish, Hartford Steam Boiler Inspection & Insurance Co.; C. J. Holslag, Electric Arc Cutting & Welding Co.; C. H. Jennings, Westinghouse Electric & Mfg. Co.; Prof. H. F. Moore, University of Illinois; Dr. D. Rosenthal, University of Brussels, and C. L. Waddell, Worthington Pump & Machinery Corp.

APRIL 29, A. M.: Modern Spot and Relief Welding, by P. W. Fassler, manager of electrical welding division, Fisher Body Corp.; Machine Gas Welding, by J. L. Anderson, Air Reduction Co.; Welding of Steam Pipe, by a representative of United Engineers and Constructors, Inc.; and Welding of Tube Turns, by R. E. Fritsch, vice-president, Tube Turns, Inc.

The annual business meeting will be held the morning of April 27 and the annual dinner the evening of April 28.

River Steel Shipments Lower in February

Movement of iron and steel products on the Ohio River during February dropped to 40,737 net tons, according to the United States Engineer Office, Pittsburgh. This compares with 45,199 tons in the preceding month, and with 75,264 tons in February, 1931. On the Monongahela River, steel movement last month amounted only to 20,089 tons, compared with 25,327 tons in January, and 58,847 tons in the second month of 1931. Traffic in iron and steel products on the Allegheny River was resumed in February, with a movement of 2200 tons. There were no shipments in the preceding month or in February, 1931.

Northern Engineering To Do Contract Welding

The Northern Engineering Works, 210 Chene Street, Detroit, has established a welding department which is equipped to design and produce a wide variety of welded steel products for commercial use, including steel frames, bases, gear housings, casings, jigs, fixtures, fabricated structures, miscellaneous standard and special machinery parts, and machine torch cutting of intricate shapes. The Northern Engineering Works has developed this new department as a result of the extensive welding work it has done in connection with the manufacture of cranes and electric hoists.

COMPARISON OF STEEL COMPANY EARNINGS IN 1931 AND 1930

Company	Net Profit		Per Share Earnings	
	1931	1930	1931	1930
Acme Steel Co.	\$372,027	\$940,949	\$1.08	\$2.74
Allegheny Steel Co.	56,228	1,610,292	1.50p.	2.25
American Rolling Mill Co.	*3,098,445	114,094	...	0.03
Atlantic Steel Co.	*105,805	*67,276	...	...
Bethlehem Steel Corp.	115,745	23,843,406	0.12p.	5.26
Colorado Fuel & Iron Co.	*3,363,206	298,648	...	0.41
Continental Steel Corp.	*406,584	*37,908	...	...
Crucible Steel Co. of America	*2,016,517	4,045,122	...	4.59
Eastern Rolling Mill Co.	*514,888	*320,955	...	...
Follansbee Bros. Co.	*819,992	*451,979	...	...
Granite City Steel Co.	322,309	700,716	1.13	2.39
Gulf States Steel Co.	*976,230	*815,334	...	...
Inland Steel Co.	1,263,600	6,498,967	1.05	5.41
Jones & Laughlin Steel Corp.	*2,283,459	9,093,281	8.64	...
Laclede Steel Co.	148,416	451,577	0.71	2.19
Ludlum Steel Co.	*99,144	*133,697	...	...
Midvale Co.	750,116	1,403,728	3.75	7.01
McKeesport Tin Plate Co.	1,952,028	2,503,897	6.51	8.34
National Steel Corp.	4,443,323	8,415,822	2.06	3.91
Otis Steel Co.	*1,571,342	868,729	...	0.07
Republic Steel Corp.	*9,031,153	*3,522,603	...	...
Sharon Steel Hoop Co.	*1,396,995	*752,803	...	...
Superior Steel Corp.	*492,372	*358,924	...	...
Scullin Steel Corp.	*499,289	163,692	...	1.63p.
United States Steel Corp.	13,038,141	104,421,571	3.62p.	9.11
Wheeling Steel Corp.	*3,339,139	2,650,887	...	9.63p.
Youngstown Sheet & Tube Co.	*7,040,899	7,036,132	...	5.17

*Net loss. p.—Preferred.

Will Try for Iron Ore Royalty Reductions

▲ ▲ ▲

A STEP has been taken that is expected to have far reaching effect on the iron ore situation of the Lake Superior region. It is an effort drastically to reduce royalties on ores mined from many properties throughout the district.

As taxes on mining properties in the Lake region are on the ad valorem basis, the greater the tonnage that is shown in a deposit and the higher its value, therefore, the more are its taxes. Large or small output has little to do with tax assessments. Any sudden decline in production abates not at all the sums collected. Therefore the tax per ton of product jumps alarmingly in dull years. It is this fact that now has emphasized the need for readjustment. It is an axiom that a big iron ore deposit, opened but unoperated, is not much of an asset to its owner, especially if it is in Minnesota. The taxation system of the State puts a potent weapon into the hands of those who are demanding royalty readjustment, and it aids in doing what no tax laws ever should do; that is, it acts as an incentive to the confiscation of property.

Most of the leading mine operators of the region will be affected by the success of this effort. So will many of the chief land holding interests. Such consumers as the Hanna and National Steel interests, the Cleveland Cliffs and associated consumers, Jones & Laughlin, Butler Brothers, and to a lesser extent the Pickands-Mather interests, as agents and operators, are operators that are particularly concerned.

Land owners and lessors of iron mines who are most deeply interested are such interests as the Great Northern Iron Ore Properties, the Northwestern Improvement Co. (Northern Pacific Railway) and to a somewhat less extent several others. These are in part fee owners, and in part owners of underlying leases.

Numerous Leases Might Be Cancelled

The arguments advanced by lessees are that royalties are seriously out of line under present business conditions; that they were, in fact, never justified except by temporary circumstances, and were never based on scientific reasoning as to values. That minimums are piling up ahead of them, and must continue to do so. That royalties are such that many operators labor under severe discriminations; that taxes on royalties, intended by the State to be paid as a sort of income tax by the recipients, are as a matter of fact all paid by the

Reaction now setting in against the earlier overloading of charges against iron ore. Royalties as well as taxes are included.

* * *

Lessors of ore lands are being asked for downward revision. They must decide apparently between having leases cancelled and taking smaller tolls out of which to pay taxes.

* * *

Competition among operators to acquire ore bodies does not seem to be active, and the undercurrent of opinion is that downward readjustment will occur.

* * *

A concise review of the conditions leading to the current developments is here given.

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lessees and are an additional charge on operations. That occupational taxes, adding, say, some 15 per cent to royalties, were unexpectedly piled on top of royalties.

But the real underlying argument, perhaps not advanced but in the minds of all, is that, if the reductions are not allowed, leases may be cancelled and owners obliged to pay taxes on their own properties. There is the further general opinion that mine operators for a considerable time will be loath to re-lease mines that may have been thrown back into the hands of the owners.

History of the Royalties

There has been no general continuing scale for royalties. In the early days on the older ranges mining was on lands owned in fee by the operators and when leases came into vogue they were low. The Gogebic was based on sliding scales depending on the worth of ore at lower Lake ports. Early leases in Minnesota were made in the first flush of discoveries and were high. The original Mesaba Mountain lease was one of these, and was set at 65c. a ton. When the State legislature passed an act permitting the leasing of its mineral lands, a 25c. rate was fixed. For a time this governed lease negotiations, and most of the very important private mining leases made about that period were at the same rate.

Most of the leases made by the great timber owners, such as Hull & Rust; Alworth, Hull & Boeing; Burrows, Rust & Goff; Murphy, Dorr & Flynn; Hill, Bennett & Longyear, and others, were at this rate. The preponderating tonnages under these low-priced leases gravitated into the hands of the Oliver Iron Mining Co. At later dates, and in order to secure long-term extensions, these were revised, but never were permitted to get above, say, 30c. a ton. What were called the "old leases" on mines that went into the Great Northern Ore Properties, were made by another timber firm, Wright & Davis, and were on sliding scales. These scales were based on the tonnage produced in any one year, not on price as was the case on the Gogebic. They ranged from 27.5c. to 12.5c. Mahoning, for example, has been paying 12.5c. a ton in any year when its production reaches 1,500,000 tons.

Steel Corporation leases on Great Northern ore introduced a new era in 1907. They began with a combined royalty and freight to Lake Superior of \$1.60 a ton, the freight being fixed permanently at 80c. The royalty increased year by year. If the Steel Corporation were today taking ore under that lease it would be bound to an annual minimum of 8,250,000 tons of ore and would be paying \$2.45 a ton royalty plus freight to the lake. However, there would be certain adjustments of the royalty on ores of qualities considered substandard when the lease was made.

During the life of this agreement the operator took about 10 per cent of the ore then in sight in the Great Northern lease. Quite naturally, he selected those ore deposits that were best and most easily mined. After 1915, when this lease was cancelled, the Great Northern set about re-leasing its mines to other operators, and it set a standard rate of 80c. a ton on underground ores and \$1 on open-pit tonnage. This was adhered to in general, and was followed as closely as possible by other lessors. Perhaps the highest priced lease made on the Mesaba range during that period was at \$1.35 a ton.

In the meantime the State's flat 25c. price was changed. Ore bodies owned by it and yet subject to lease were thrown open to competitive bidding, with minimum prices fixed. Today, on an ore with natural analysis of 50 per cent Fe. and the average Mesaba moisture, this minimum is about

(Concluded on page 763)

Association Executives Urge Trade Practice Legislation

Benjamin Schwartz of Scrap Institute and W. J. Parker Representing Several Organizations Urge Nye Bills

WASHINGTON, March 22.—Important accomplishments through its trade practice code were pointed to by Director General Benjamin Schwartz of the Institute of Scrap Iron and Steel last Thursday in the course of testimony before a subcommittee of the Senate Judiciary Committee in support of the Nye bills to legalize trade practice conferences. One of the results was declared to be the practical elimination of "top dressing" of cars. Mr. Schwartz said that during the first two years of operation of the code 50 complaints against this deceptive practice had been made to the Institute by steel mills, while last year only two had been received. The code, he declared, had accomplished since 1929 what steel consumers had been trying to accomplish for a quarter of a century.

He proceeded to explain, however, that uncertainty as to the code has developed as the result of the proposal of the Federal Trade Commission to eliminate the rule which condemns failure of dealers or brokers to give credit for overweight. Because of these uncertainties, Mr. Schwartz emphasized the need of machinery such as the proposed legislation provides to test the practices in the courts.

The scrap code, he declared, sets up rules for ethical conduct, but has nothing to do with prices. Mr. Schwartz declared that the public is not entitled to such low prices that the manufacturer cannot make a profit.

He said he was in favor of making the trade practice rules binding on the minority of an industry.

Minority Sets Profitless Price

"The average business man is honest and should be relieved of the fear of what the small minority will get away with," said Mr. Schwartz. "There is usually a minority in every industry which sets the profitless price for the rest of the industry and sets unfair practices as a standard which the majority often is compelled to follow if it is to stay in business."

Representing the Forging Manufacturers' Association and 14 other associations, W. J. Parker, New York, declared that development of trade practice conferences requires legislation which will remove all doubt as to the rights of the Federal Trade Commission, which will provide for judicial review of conference rules, and which will afford assurance to the members of an industry that if their rules are

approved by the commission they should not be subjected to prosecution by another branch of the Federal Government. Mr. Parker said that, if it is thought differences of opinion as to the legality of the rules may develop between the Department of Justice and the commission, Congress should provide means for adjustment of the differences. He favored limited immunity from prosecution, to prevail until an industry is notified by the commission of its reversal of its

opinion. He also declared that the minority in an industry should be bound by rules adopted by the majority.

Asks for Speedy Decisions

Benjamin A. Javits, attorney for the Candy Institute, suggested requiring that the commission give its decisions with respect to rules within 30 days after a conference has been held.

"Business would then look with a new attitude of hopefulness on the work of the commission, in contrast to its present lack of confidence due to the great length of time," said Mr. Javits.

It is expected that when the hearings are resumed that a member of the Federal Trade Commission and possibly a representative of the Department of Justice having to do with anti-trust litigation will be asked to testify.

French Quotas for Machinery Imports Exclude Some Items

Unrestricted American Tools Include Lathes, Reamers, Slotters, Drilling and Sharpening Machines, Gear Cutters

WASHINGTON, March 22.—Some important lines of metal-working machinery and machine tools in which the American industry specializes are given unrestricted entry into France under its import quota system, which was announced by official decree on March 16. The restrictions are to apply for the four-month period from March 1 to June 30, according to cablegrams received by the Department of Commerce from Commercial Attaché Fayette W. Allport, Paris. By reason of the exemptions granted, the quotas will not be nearly so severe against American shipments as had been expected. So far as is known, additional restrictions are not contemplated, though American interests have not been informed definitely.

Unrestricted lines include such units as lathes, reamers, slotters, drilling machines, sharpening machines and gear cutters.

On the other hand, some important lines are included in the quota set-up. Metal-working machine tools, steam hammers, shearing, stamping, drawing, shaping, and forging machines do not carry an individual quota except for Germany, which was granted the right to ship 576 tons of this class of machinery in the four-month period. The remainder of the quota is 43 tons for all other countries. Machine tools and similar apparatus not included in the foregoing classification carry quotas divided between the United States and Germany only, the United States share being only 21.8 tons, while Germany is permitted to export

316 tons. Strip steel is included in the quota system, but is unimportant so far as the United States is concerned.

German Shipments Favored

The Department of Commerce statement said, in part:

"While the exact quotas allotted to Germany under the various categories have not yet been received, it is reported that the combined total of the quotas fixed for imports from Germany represent about one-half of the combined total for the aggregate of the products affected. German deliveries for the account of reparations in kind are not included in the quotas.

"The French customs administration may exempt from the quota limitations shipments specifically certified by the "Fédération de la Mécanique Française" to be essential to French industry.

"When the prospective establishment of an import quota into France on machine tools was learned of, the American ambassador requested that the establishment of the quota be postponed until the viewpoint of the American industry could have been presented through their designated representatives at Paris. To this the French minister replied, on the date of the present quota decree, that he could not defer enactment of the machine tool quota, but that he would point out to French industries concerned the desire of the United States that representatives of affected American industries be included in future pre-quota conversations."



Delay in Public Showing of Ford Cars Acutely Felt at Detroit

DETROIT, March 21.

THE delay in the presentation of the Ford cars is having a depressing effect on local industry which will not be corrected until the public has an opportunity to view the new models. Motor car output usually shows a sharp gain in March, whereas this year it is pegged at about February's level; likewise, contrary to the normal seasonal trend, employment has declined this month in the Detroit district and the city is faced with the most serious welfare and relief problem in months.

Many Ford suppliers have been virtually idle for weeks, although toolled up ready to start operations on a moment's notice. Scarcely an automobile maker has escaped the buying lull resulting from Mr. Ford's recent pronouncements. Some companies in the \$1,000 class, such as Buick, are attempting to offset this development by staging an intensive sales drive. Although the recent statements by Mr. Ford were immediately followed by an optimistic wave of sentiment in this city, the effect of days and weeks passing without tangible evidence of the beginning of large scale production at Rouge has been to bring about a reaction on the pessimistic side.

Fords May Be Shown on March 26 or April 2

Perhaps the strain of waiting will be relieved shortly, for latest reports put the showing of the new Fords on either March 26 or April 2, with the latter the more likely date. Assembly work has been going ahead on the basis of 100 cars a day, with a step-up to 200 planned for this week. It is hoped that by March 28 activities will have progressed far enough that production can be advanced to from 500 to 1000 cars a day. Releases to parts makers are understood to have been on a restricted basis, consisting mostly of a volume which would be considered trivial in normal times. It is

Orders for new Fords said to have passed the 200,000 mark.

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New Plymouth is to be shown on April 3.

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Chevrolet is not expected to offer new models until next November or December, despite competition of a Ford eight.

* * *

believed that the manufacture of frames at the Rouge plant has not been running over 1000 a day three days a week, while Murray's frame department at Ecorse has been idle awaiting word to go ahead. Steel purchases have been only in small quantities, the largest order having been for steel bars for certain parts for 20,000 to 25,000 cars. Despite the already long postponement of Ford steel buying, no definite information is available when quantity commitments can be expected. It would not be surprising if these were not placed until about April 1.

It is said that the number of orders now on hand for the new Fords has passed the 200,000 mark. Some of these orders are the outcome of speculative activity. That is, a man will put in an order for a car with a dealer, making a small cash deposit, in the hope that later on he can sell his position, so far as early delivery is concerned, at a profit. While it is believed that this sort of thing is going on now, it is not nearly so widespread as when Model T succeeded Model T. If history repeats itself, and indications are that it may, the Ford Motor Co. will not be able to attain volume production (4000 to 5000 cars a day) for months. Some observers believe that without much selling effort it will have all the business it can handle for at least the next year, in view of the fact that

it will be slow in expanding its operations.

Mr. Chrysler has announced that the new Plymouth will be shown on April 3, at which time he will make a strong bid for primary consideration in the volume car field with a car striking in appearance and low in price. Plymouth continues to adhere to a schedule of 18,000 cars this month; April should see this level maintained or increased.

Numerous reports have been circulated that Chevrolet intends to match the Ford V-eight with an eight-cylinder car, thus establishing a line of sixes and eights against Mr. Ford's fours and eights. It can be asserted with authority that these reports are unfounded. Chevrolet feels that it is in a commanding position just now, with the Ford Motor Co. on the defensive. By the time that Ford can get into sufficient production that its competition will become threatening, the year will be far enough along that Chevrolet will be about ready to introduce new models. Meanwhile, Chevrolet will be content to stand by its current six-cylinder car and watch the way in which the new Fords are received by the public. The Chevrolet gray iron foundry at Saginaw is turning out about 1200 tons of castings a day, three days a week. For its Flint, Mich., plant Chevrolet the past week made the smallest steel purchase in months.

Reo Also to Offer New Car

Reo's new car, to sell slightly under \$1,000, is a six and will be offered some time during April. The Continental DeVaux Co., successor to the DeVaux-Hall Motors Corp., will begin the manufacture of DeVaux cars April 1, producing the same models displayed at the New York show. Continental Motors Corp., through this subsidiary, is going into automobile building with the idea of diversifying its products rather than because of its position as one of DeVaux-Hall's larger creditors.

Mills Say Only Congress Can Bar Russian Products

WASHINGTON, March 22.—Denial of entry to the United States of all goods produced by forced labor is a matter for Congress and not the Treasury Department to decide, Secretary of the Treasury Ogden L. Mills told a delegation last week. The delegation included members of Congress, representatives of the domestic manganese, coal, oil, and other industries, who declared that these products are produced by forced labor in Russia and should not be allowed to enter the United States. They discussed possible application of Section 307 of the tariff, which prohibits imports of products produced by forced or indentured labor which are not produced in sufficient quantities in the United States as to meet consumptive demands.

Secretary Mills pointed to the fact that it is necessary to obtain proof as to individual shipments whether they were produced by forced labor and also explained that all goods so produced plainly are not subject to embargo and could be made so only by Congressional action.

Assistant Secretary of the Treasury Lowman, in charge of customs, told the delegation that the Treasury was too ready to call all labor under the Soviet system forced labor. He declared that American import trade with Russia includes only goods which are essential to the United States, naming manganese ore as one of the products. Manganese ore interests, however, strongly deny this and also claim to have affidavits proving manganese ore is mined in Russia by forced labor.

Senator Oddie of Nevada, spokesman for the delegation, said he proposed to introduce legislation to bar Russian products produced by forced labor.

National Metal Trades to Meet April 20

The National Metal Trades Association will hold its thirty-fourth annual convention at the Hotel Commodore, New York, beginning April 20. Among the subjects to be discussed are the following: The destiny of our major industries; the status of credit and recent financial developments; unemployment insurance; recent legislation and legislative tendencies; the necessity for drastic reduction in national and local government expenses; the significance of the Sino-Japanese conflict; recent developments in rackets and radicalism; labor management in the future. One of the speakers will be George Sokolsky, editor, *Far Eastern Review* and an authority on politics and economies in Manchuria, China, Japan and Russia, where he has spent most

of the past 15 years. He will discuss the Far Eastern situation.

The National Metal Trades Association's committee on industrial relations has just published a report on unemployment insurance, which will be discussed at the convention.

Jacob D. Cox, Jr., Cleveland Twist Drill Co., Cleveland, is a nominee for the presidency of the association to succeed J. D. Benedict, Landis Machine Co., Waynesboro, Pa., who has held that office for two years.

Youngstown—Wheeling Census Figures Issued

WASHINGTON, March 22.—Products of 35 steel works and rolling mills in the Youngstown industrial area in 1929 were valued at \$440,821,373, or 53 per cent of the total value of \$823,532,610 of products of the 612 manufacturing establishments in the area. Adding \$99,009,141, covering the value of products from 13 blast furnaces, the percentage rises to 65 per cent. The figures, disclosed by the Bureau of the Census, cover Mahoning and Trumbull counties in Ohio and Lawrence and Mercer counties in Pennsylvania.

In the Wheeling industrial area products of 18 steel works and rolling mills were valued at \$140,357,807, or 44 per cent of the total value of \$319,433,328 of 537 manufacturing plants.

With the addition of \$24,383,635, covering the value of products of six blast furnaces, the percentage becomes 52. The Wheeling industrial area embraces Brooke, Hancock and Ohio counties, W. Va., and Columbiana and Jefferson counties in Ohio.

The average number of wage earners in the steel works and rolling mills in the Youngstown area was 41,628, whose wages aggregated \$79,477,609. The total number of wage earners for all the manufacturing plants was 78,903, with wages amounting to \$138,076,535. Wages paid the 3287 blast furnace workers were \$6,262,227.

The average number of wage earners in the Wheeling district steel works and rolling mills was 18,032, with wages of \$33,679,249, while the total number of wage earners in all establishments was 45,906, with wages of \$70,728,962. Wages paid the 758 blast furnace workers totaled \$1,375,959.

The value of products in other prominent industries in the Youngstown district follow: Foundry and machine shop, \$50,457,821; electrical machinery, apparatus and supplies, \$45,707,654; coke, not including gas house, \$21,476,447; steam railroad car construction and repair shops, \$11,155,956.

Figures in the Wheeling district include foundry and machine shop products, \$8,008,280; and non-ferrous alloys, \$2,740,711.

▲ ▲ ▲ OBITUARY ▲ ▲ ▲

JOHN T. CLANCY, assistant manager of oil and gas engine sales, Worthington Pump & Machinery Corp., Harrison, N. J., died of a heart attack on March 9, while lecturing at the Engineers' Club, New York, before a meeting of the American Society of Mechanical Engineers. He had been identified with the Worthington company since 1919.

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JACOB KASTLIN, formerly vice-president and general manager of the Davenport Locomotive & Mfg. Co., Davenport, Iowa, died at his home there on March 6, aged 76 years. He came to this country from Switzerland in 1876 to assemble knitting machinery at the Centennial Exposition. He later joined the staff of the Burlington Railroad and went to Davenport in 1905 as superintendent of the locomotive works, of which he became vice-president and general manager. He retired in 1923.

* * *

HARVEY Z. KELLY, widely known in the Midwest steel trade, died suddenly March 18, aged 59 years. He was connected with the National Bearing Metal Co., Pittsburgh, as a traveling representative, and had been previously connected with the Falcon Bronze Co., Youngstown.

ISAAC H. ARNOW, secretary, Northwestern Electric & Machinery Co., Milwaukee, died at his desk from apoplexy on March 16, aged 63 years. Before joining the Northwestern company he had been secretary of Grossman Brothers Co., Milwaukee, scrap metal jobber.

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EMANUEL A. WURSTER, who was secretary-treasurer of the Falk Corp., Milwaukee, from its inception until his retirement in 1924, died at Omaha, Neb., on March 18, aged 71 years. Since his retirement he had lived in Omaha.

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JOHN BRAUN, vice-president, Midland Structural Steel Co., Chicago, died of heart disease, March 16 at the Evanston, Ill., hospital. He was 53 years old.

* * *

RICHARD G. ERICKSON, of the Federal Machinery Sales Co., Chicago, died March 16 from complications that followed an operation for appendicitis. Mr. Erickson was born in Chicago and gained his first experience in the machine tool business with Manning, Maxwell & Moore, Inc. He joined the Federal sales organization in 1919.

...PERSONALS...

W. J. COOK celebrated his fiftieth anniversary as executive head of the galvanizing departments of the Wheeling Steel Corp., and predecessor companies at Wheeling, W. Va., on March 15. Mr. Cook went from Chicago to Wheeling in 1882 to undertake the installation and operation of a galvanizing shop for the Whitaker Iron Co., sheet manufacturer. He was born in Staffordshire, England, and came to this country with his father in 1867. During the various changes in the old Whitaker company he has continued in the same job, and during his career the company's galvanizing capacity has grown from 35,000 tons annually in 1884 to 350,000 tons, which was attained in 1929.

The activity of Mr. Cook's immediate family in the galvanizing industry is probably unique. His father, prior to his immigration to the United States in 1867, was in charge of galvanizing in a plant owned by the latter's parents. Upon arriving in this country, the elder Mr. Cook took charge of the plant of Moorehead & McLain, known as the Soho works, which turned out galvanized sheets under that brand name. Mr. Cook later organized his own business at Chicago, where W. J. Cook received his first training in the proper hot zinc bath for galvanizing. W. J. Cook has also introduced his own son into the same business, the latter now serving as assistant manager of galvanizing for the Wheeling corporation. A brother of W. J. Cook, the late Thomas Cook, operated the galvanizing shop of the American Sheet & Tin Plate Co. at Cambridge, Ohio, from 1893 until his death in 1923. Another brother, E. B. Cook, started a galvanizing plant for Arms Brothers at Niles, Ohio, in 1891, and has since been in charge of similar installations in many other parts of the country. Fred Cook, another brother, has been in charge of tube galvanizing for the Republic Steel Corp. at Youngstown for approximately 30 years.

MYRON C. TAYLOR, chairman of the finance committee of the United States Steel Corp., was the guest this week of the Boston Chamber of Commerce and spoke on the importance of reaffirming our faith in well established principles. He also discussed the tariff, taxation and present-day conditions.

W. R. ANGELL has been elected president of the Continental DeVaux Co., subsidiary of Continental Motors Corp., Detroit, which has been organized to take over the manufacture of the DeVaux automobile formerly produced by the DeVaux-

Hall Co. Mr. Angell is president of Continental Motors. Other officers of the new concern are ROGER SHERMAN, vice-president; CRAIG KEITH, secretary; and WALLACE ZWEINER, treasurer.

R. W. CORNELISEN, heretofore assistant general sales manager of both the Lakewood Engineering Co. and the Jaeger Machine Co., Cleveland, has become field sales manager of the Northwest Engineering Co., Chicago. He is a graduate of the University of Illinois and has been identified with the Lakewood company since 1919.

D. D. BARNES, formerly sales manager for the Smith Engineering Works, Milwaukee, has joined the sales staff of the H. O. Penn Machinery Co., New York, distributor in that territory for the Byers Machine Co., Ravenna, Ohio.

GEORGE RHOADS CASEY, who has been connected with the Treadwell Engineering Co., Easton, Pa., for over 20 years, for the past five in charge of sales, has been elected vice-president and general manager. He succeeds A. A. NEAVE, who has resigned.

RALPH FINK, formerly with the American Stove Co., Cleveland, has joined the laboratory force of the Ferro Enamel Corp., Cleveland.

GUY H. BILLINGS, for the past 17 years purchasing agent for the Four Wheel Drive Auto Co., Clintonville, Wis., has been made assistant general manager, continuing as purchasing agent.

CHARLES A. OOSTDYK has been appointed director of purchases of the Hudson Motor Car Co., Detroit.

SAMUEL S. WYER, industrial research engineer, Columbus, Ohio, will address the annual dinner meeting of the Indianapolis branch of the National Metal Trades Association on March 31, taking as his subject "Startling Facts in Today's Economic Muddle." HOMER D. SAYRE, commissioner, and W. E. ODOM, director of industrial relations of the National Metal Trades Association, also are on the program.

WALTER BEECH, veteran pilot and commercial plane manufacturer, has resigned as president of the Curtiss-Wright Airplane Co., located at Lambert-St. Louis Field, and as vice-president of the Curtiss-Wright Corp. of New York. He intends remaining in the aviation business as

a builder of speed planes. Mr. Beech organized the Travel-Air Mfg. Co., Wichita, Kan., which was taken over by the Curtiss-Wright organization in 1929, and previously was with the Swallow Airplane Co.

EDWARD F. NIEDECKEN, vice-president and chief engineer, Hoffmann & Billings Mfg. Co., Milwaukee, manufacturer of plumbers' and steamfitters' supplies, has been elected president, to succeed the late Fred Hoffmann. Mr. Niedecken became associated with the company in an engineering capacity in 1894 after several years with the Filer & Stowell Co., and was elected vice-president in 1897. He is widely known as an inventor and designer of sanitation devices.

W. G. PEARCE, of New York, has been elected a director of the Bu-cyrus-Erie Co., South Milwaukee, Wis., to succeed the late J. B. Terbell. Mr. Pearce is chairman of the executive committee, American Brake Shoe & Foundry Co., of which Mr. Terbell also was an executive.

H. J. FRENCH, research metallurgist, International Nickel Co., New York, has been selected by the American Society for Steel Treating to deliver the Campbell memorial lecture at the National Metal Congress in the fall of 1933.

Railroads Seek Exemption From the Sales Tax

WASHINGTON, March 22.—The Association of Railway Executives is showing a great deal of interest in the pending manufacturers' sales tax now before the House. The association has asked that rail carriers be exempted from the tax owing to their financial inability to stand it. So far as known the matter was not discussed at the White House. The railroads, it has been pointed out, would be especially hard hit by the tax if it is passed on to them since they are ultimate and tremendous consumers and could not pass the tax on to shippers and passengers.

The iron and steel and other industries supplying railroads also have shown an interest in the tax not only as they are directly concerned but also as it relates to the rail carriers. These industries themselves are suffering severely from the depression and take the position that they are not able to absorb taxes on materials going to the railroads. In view of the competitive situation which some claim would tend toward making such absorption necessary the question has excited keen interest.

National Steel Corp. has reduced its quarterly dividend from 50c. to 25c. a common share, effective March 30.

British Steel Industry Wants Greater Tariff Protection

Increases Up to 33½ Per Cent Requested—Continental Gold Prices Again Decline on Keen Competition

LONDON, ENGLAND, March 21 (By Cable).—The steel industry is requesting tariff increases up to 33½ per cent ad valorem. The advisory committee, regarding the matter as urgent, has commenced investigation.

Fair orders have been received for rails from other countries, including the British Colonies and Russia.

Continental gold prices are easier because of keen competition for business. British steel users are again buying. Lithuania has placed orders for Belgium rails amounting to 20,000,000 fr.

The Western European pig iron entente has been renewed until April 30. Hopes are entertained that an agreement will be concluded with French interests which have not yet joined and if this happens it is expected that the entente will become an important factor in export markets.

Welsh tin plate minimum prices have been established as follows: oil sizes 18³/₄ x 14 in. 16s. 7½d.; 20 x 10 in. 23s. An extra of 3d. is charged for deep drawing quality. These prices are f.o.b. makers works. The tin plate restriction plan will operate for 15 months from March 8, after which a three months' notice for cessation of membership will be required,

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9 0s.
Billets, open-hearth....	5 7½ to £5 12½s.
Black sheets, Japanese specifications	9 12 6d to 9 15
Tin Plate, per base box	0 15 6 to 16 0
Steel bars, open-hearth....	7 17½ to 8 7½
Beams, open-hearth....	7 7½ to 7 17½
Channels, open-hearth....	7 12½ to 8 2½
Angles, open-hearth....	7 7½ to 7 17½
Black sheets, No. 24 gage	8 0 to 8 10
Galvanized sheets, No. 24 gage	9 10

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at \$1.86

Billets, Thomas.....	£2 5s.
Wire rods, No. 5 B.W.G.....	5 5
Black sheets, No. 31 gage, Japanese.....	11 5
Steel bars, merchant.....	2 8
Beams, Thomas.....	2 8
Angles, Thomas, 4-in. and larger.....	2 7
Angles, small.....	2 9
Hoops and strip steel over 6-in. base.....	3 7 6d
Wire, plain, No. 8.....	5 7½
Wire, barbed, 4-pt., No. 10, B.W.G.....	8 15

International Tube Cartel are resigning, effective March 31. Price negotiations will be begun and there are hopes that the cartel will be renewed. International Tube Cartel expects that the Irak Petroleum Co. order for 120,000 to 150,000 tons of pipe will be placed shortly. A meeting of the oil companies interested in this project will be held in London soon to reach a decision.

Representatives of the United Kingdom, United States and Canada will soon discuss a renewal of the gas tubes agreement.

M. Von Hoegarden of Ougree Marihayé, commenting on the refusal of certain Belgium producers to accept the quotas offered in the proposed Belgium syndicate, declared: "The struggle will now be renewed more sharply and senselessly, costing producers and the country millions of francs which are unrecoverable."

English members of the Interna-

Mellon Institute Discovers Method of Applying Felt Coating to Steel

Felt-coated steel, a new protected metal, has just been announced by the Mellon Institute of Industrial Research, Pittsburgh. It is called "Robertson-Bonded Metal" (R-B-M). It is believed that the felt coating of metal opens up a world of new commercial possibilities.

According to a research report by Dr. A. W. Coffman, the new metal is the result of extensive research that has led to the production of a laminated metal-felt material in which felted materials are cemented to steel with heat and pressure utilizing metals as adhesives. The composite laminated material, the outer surfaces of which are suitable felts, is then saturated with any desired saturant, chosen with reference to the corrosive condition with which the metal is to be exposed in service. Paint, lacquer and resin films, superimposed on the saturated felt, give not only added protection but also desired attractiveness of appearance in the finished product. It is stated that new plastics, which imitate anything from jewels and silks to various woods, can be used.

The ductile nature of the metal bond between felt and steel, according to Dr. Coffman's report, makes it possible to subject this material to forming operations, such as shearing, bending, corrugating, rolling and mild drawing without destroying the adhesion between felt and steel. It has even been rolled into pipe and a cellulose-coated piece of steel was elongated 8 per cent by cold rolling, it is stated. Asbestos felt together with a fireproof saturant can be used for building purposes, and it is also

stated that this new material has the strength of metal with none of the attendant ring and reverberation of bare metal.

This new felt-coated steel is said to have a promising field of application, not only in the building field, but also in the manufacture of paneling for various purposes, pipe line protection, novelties, etc., and the cost is reported to be commensurate with the degree of protection desired.

Wire Makers to Join in Steel Treaters Meetings

The wire industry will have an important share in the 1932 National Metal Congress and Exposition in Buffalo Oct. 3 to 10, according to W. H. Eisenman, secretary, American Society for Steel Treating, and director of the exposition. The Wire Association will hold a series of meetings as part of the congress, while a number of wire and wire-drawing equipment manufacturers have reserved space in the exposition.

In addition to the Wire Association, the following technical societies will cooperate with American Society for Steel Treating in the congress: American Welding Society; Institute of Metals and iron and steel division, American Institute of Mining and Metallurgical Engineers; iron and steel division, American Society of Mechanical Engineers, and production activity division, Society of Automotive Engineers.

Sheet Steel Production Largest Since July

Production and shipment of steel sheets gained slightly in February over January, according to the monthly report of the National Association of Flat Rolled Steel Manufacturers comprising independent producers. However, sales and unfilled orders declined. Production, amounting to 124,157 tons, was larger than in any previous month since last July, and shipments, aggregating 116,715 tons, exceeded those in previous months since last October. Sales declined to 108,441 tons from 121,258 tons in January, and unfilled orders on March 1 were 118,022 tons, compared with 126,508 tons on Feb. 1. The February report and comparison in net tons follow:

	Feb.	Jan.	Dec.
Sales	108,441	121,258	99,706
Production	124,157	118,921	101,570
Shipments	116,715	112,971	103,400
Unfilled orders....	118,022	126,508	119,677
Unshipped orders ..	51,485	45,748	46,349
Unsold stocks.....	72,857	73,540	80,191
Capacity per month	555,000	555,000	559,000
Percentage reporting	68.7	68.7	68.9
Percentages, Based on Capacity			
Sales	28.4	31.8	25.9
Production	32.5	31.2	26.3
Shipments	30.6	29.6	26.8
Unfilled orders....	30.9	33.2	31.0
Unshipped orders ..	13.5	12.0	12.0
Unsold stocks.....	19.1	19.3	20.8

Foundry Equipment Orders Gain

Foundry equipment orders in February, represented by the index figure 27.6, were the largest for any month since last October, according to monthly statement of Foundry Equipment Manufacturers Association. The February index figure compares with that in January of 20.5; December, 20.9; November, 17.2, and October, 44.8. The association derives its base 100 from the average monthly shipments in 1922, 1923 and 1924.

United Engineering Plant Completes Improvements

Coincident with the completion of substantial improvements, the Canton, Ohio, plant of the United Engineering & Foundry Co., Pittsburgh, is this month casting its 10,000th furnace heat and its 110,000th roll. The plant, which is devoted exclusively to the production of iron and iron alloy rolls, is said to be the largest cast iron roll foundry in the world, and is this month observing its twenty-fifth anniversary.

Since the first roll was cast in March, 1907, rolls have been produced with a 6-in. face for the rolling of silver, requiring 100 lb. of hot metal, as well as rolls 44½ in. in diameter and 160 in. long for plate mills, requiring 120,000 lb. of hot metal. Its initial capacity was 400 tons a month,

and equipment consisted of four belt-driven roller lathes. Today the capacity is 4000 tons a month, with correspondingly greater lathe and grinding equipment.

To Discuss Automotive Products Tests

Various aspects of service testing of automotive products and correlation with laboratory tests will be discussed at a meeting to be held at the Fort Shelby Hotel, in Detroit, the evening of March 28 under the auspices of the Detroit district committee of the American Society for Testing Materials and the Detroit chapters of the American Society for Steel Treating and the Society of Automotive Engineers. The technical session will be preceded by dinner.

The seven papers to be presented include: "Destructive Testing of Automotive Products," by J. M. Watson, metallurgical engineer, Hupp Motor Car Corp.; "Service Complaints on Automobiles as Related to Engineering Tests," by Nicholas Dreystadt, general service manager, Cadillac Motor Car Co.; and "Relation of Service Testing to Metallurgy of Automobile Parts," by J. L. McCloud, metallurgist, Ford Motor Co.

necessitated several departures from established principles of lathe design. In addition to the increased power, range and rigidity of the machine as a whole, many of the details, such as the chip breaker, the follow rest having three round jaws tipped with tantalum carbide, and the chip conveyor having a chip disposal capacity of 15 cu. ft. per min., challenged the interest of visitors.

The lathe was demonstrated in cutting steel shafting similar to that used for large turbine and armature shafts. Using cemented carbide tools, roughing cuts up to ¾ in. were taken at 450 ft. per min., and finishing cuts at 650 ft. per min. It was planned to conclude the exhibit on March 12, but because of the interest shown in this and in other lathes in operation with cemented carbide tools the exhibit was extended into the week of March 14.

Domestic Manganese Ore Shipments Lower in 1931

SHIPMENTS of manganese ore containing 35 per cent or more of metallic manganese from domestic mines were approximately 39,000 gross tons, valued at \$699,400 in 1931, as compared with 67,035 tons, valued at \$1,437,465 in 1930, according to the United States Bureau of Mines,

Super Lathe Exhibit Attracts Many Visitors

An exhibition of 23 or more new model lathes, radial drills and shapers at the plant of the American Tool Works Co., Cincinnati, during the week of March 7 was attended by about 1000 representatives of a variety of metal-working plants. An outstanding feature was the 22-in. 100-hp. Super lathe built for the General Electric Co., for determining the maximum possibilities of cemented carbide tools in machining a wide variety of materials. With a power input of 100 hp. and 140 spindle speeds ranging from 3 to 1200 r.p.m., and a total weight of 40,000 lb., this machine

DO YOU KNOW WHO MAKES NUCHROME?

A MANUFACTURER telegraphed us recently asking the name of the concern which makes Nuchrome. He said he wanted this material for reflectors which he makes. We have been unable to locate anyone who knows Nuchrome. Can you give this manufacturer of reflectors any assistance?

Financial Notes

International Nickel Co. of Canada, Ltd., operated in 1931 at a profit of \$5,094,497, compared with \$11,770,060 in 1930, after full charges for depreciation, depletion, taxes and other reserves. Earnings in 1931 were equivalent to 22c. a share on the common stock, after allowing for preferred dividends of \$1,933,937, compared with 67c. a common share in 1930.

Acme Steel Co. has declared a dividend of 30c. a share. On Jan. 2, 1932, a dividend of 40c. was paid, and on Oct. 1, 1931, a distribution of 50c. was made. Prior to Oct. 1, last, dividends had been paid at the quarterly rate of 62½ cents.

American Locomotive Co. in 1931 had a net loss, after depreciation and all other charges, of \$3,929,384, compared with a profit of \$3,778,557 in 1930.

Continental Roll & Steel Foundry Co., East Chicago, Ind., reports a net loss of \$113,590 in 1931.

American Steel Foundries reports net loss for 1931 of \$791,373, compared with net profit in 1930 or \$2,801,442.

United States Pipe & Foundry Co. had net income in 1931 of \$1,012,215, compared with \$2,881,046 in 1930.

• • E D I T O R I A L

Balancing the Budget

THIS matter of budget balancing is not an exclusive problem of Uncle Sam's. It is also a problem, and a pressing one, for Tom, Dick and Harry. Every concern and every individual that faces the necessity of making both ends meet in these days of reduced income must do some intensive budget balancing.

Looking at it from an unbiased viewpoint it would seem that the balancing problem of the individual business or person is not as simple as that of Governmental budget balancing. The private person or company has but one way to go about the task and that is to cut expenses to match income. We would all like to go about it the other way, namely by increasing our own salaries, wages, dividends or the prices at which we sell our goods, but this easy way, unfortunately, is not practical nowadays.

Uncle Sam seems just now to consider himself an exception to the rule of necessity. Although Governmental economy is certainly better than increased public taxation, most of the noise emanating from Capitol Hill today relates to the bolstering up of Government income and very little of it to the trimming down of Government expenses.

Uncle Sam has been "living high" ever since the war. In fact, he has had his salary boosted year after year for the past ten years. It is going to be hard for him to adjust himself, as he eventually must, to a considerably diminished income for some years to come. But the process will do him good and us too.

The Machine— Chief Foe of Overproduction

CRITICS of the machine delight in pointing to the world surplus of goods as damning evidence against it. Yet the fact of the matter is that the machine offers the only means of overcoming overproduction, particularly overproduction of raw materials. The marked stimulus that the war gave to output in non-combatant countries left them with capacities that became burdensome when the warring nations resumed productive pursuits. But for the machine the weight of excessive productive capacity and enormous war debts would have immediately plunged the world into a severe depression. Paying for dead horses in the shape of war costs and unused productive facilities would have left little to keep the wheels of business moving. In fact, such a denouement was the common expectation of economists and business men alike.

And how did the machine intervene? In the industrial countries, and especially in the United States, mechanization yielded such large savings that vast quantities of consumer goods were brought within the reach of millions. The materials needed in making such products

were secured from all parts of the globe. These requirements became so great that this country reached a position where it consumed one-half of all the basic commodities produced in the world excluding rice.

It is not to be wondered at that the current depression is worldwide. Curtailed consumption here means distress in the raw material countries. Their reduced purchases from Europe, in turn, are finally reflected in Europe's decreased consumption of our cotton, wheat, copper and oil.

The way out of this predicament does not lie in a retreat from the machine. On the contrary, it lies in the direction of further perfection of the machine. The instrument which, unaided, kept the world out of economic stagnation in the post-war 20's, is our main hope for deliverance from depression in the post-panic 30's.

• • • Steel Barrel Reports Confusing

A RECENT report, covering steel barrel production, stated that the total number of barrels produced in 1931 was about 6,000,000. Without further details such a figure is misleading for the term steel barrel covers a wide variety in size and weight of container. A production figure of the same total covering practice in 1927 or 1928 would mean a much heavier steel consumption, because the trend in steel drums during the past four or five years has been toward the use of lighter gage steel and smaller sizes.

Perhaps the most satisfactory way to give comparative figures of barrel production would be to give the weight, but that would be exceedingly difficult without detailed reports from all of the principal barrel makers, and such reports are not available. One authority estimates that of the total number of steel barrels produced in 1931, 40 per cent were so-called light-weight barrels and 60 per cent were heavy. Of the heavy barrels approximately 80 per cent were made up of the standard 55-gal. single trip container which is made of 18-gage steel and which weighs about 51 lb. The remainder of the heavy classification is made up largely of 30-gal. drums of 19-gage steel weighing about 30 lb. each, and 15-gal. drums of 19-gage steel weighing about 19 lb. each.

The light-gage containers are more varied, but the principal items are a 50-gal. drum of 26 or 28-gage, weighing about 15 lb. and a 27-gal. 26-gage drum weighing 12 lb. The approximate total weight represented by the 1931 production of 6,000,000 drums and based on the above estimated percentages is 96,000 tons. The former popular 16-gage 55-gal. drum weighing 80 lb. has now practically become obsolete, due to better design and better methods of making the 18-gage drums.

COMMENT . . .

Railroads Should Give as Well as Take

feeling that the railroads have not lived up to the implied promises upon which higher freight rates and reduced wages were granted. The railroads, of course, stepped into the breach in the early part of 1930 to "save" the country from depression. Their large expenditures following the stock market panic of 1929 were a direct result of the appeal made by President Hoover to the country's leading business interests in the effort to re-establish confidence.

Granted that the railroads—or at least many of them—have reached a condition where financial rehabilitation must precede any large expansion of purchases for physical betterments, it remains that no industrial class in the country has had so much done for it. Besides the savings accruing from a voluntary reduction in wages and the increased revenues resulting from higher freight rates, the railroads have been the recipients of loans from the Reconstruction Finance Corporation to a larger extent than any other class, with the possible exception of the banks. It is true that many of these loans have been made so that railroads may meet maturing bond payments and interest. In only a few instances have loans for betterments been requested. The outstanding case of this kind is the appeal of the Pennsylvania for a loan of \$55,000,000 to complete its electrification project between Newark and Washington.

Enlightened self-interest on the part of the railroads should convince them that they can do a great deal to help the public and themselves while the public is helping them through preferential treatment. Many of the betterments in which they could engage involve the use of large amounts of steel. There is scarcely any product used by the carriers which multiplies itself to such an extent as steel in terms of freight haulage. From four to five tons of materials are transported for every ton of steel made. The railroads would benefit from every steel purchase by being able to transport larger amounts of ore, coal, scrap, ferromanganese, limestone and other raw materials. Yet, in the face of the fact that the railroads can do a great deal to help themselves out of their present dilemma and notwithstanding the infernal promises that they would increase their expenditures if they received higher freight rates and wage reductions, they have done comparatively little thus far to place the orders that have been expected from them.

Eventually, the railroads are going to need a great deal of new equipment. All of the locomotives now in service that are more than 10 years old are virtually obsolete. The Chicago & Alton is scrapping 116 locomotives

and 8000 old freight cars. The New York Central has started to scrap its old engines, and the total number to be broken up this year may be 200 to 300. The Alton's program of scrapping involves about half of its locomotives and more than half of its freight cars. No class of purchases can be more readily financed than railroad rolling stock. A year or so ago the car builders had a program worked out by which the railroads could obtain credit for 100 per cent of the cost of cars they might buy, but no business resulted. Their decision to refrain from buying them may have been warranted, but they cannot continue to remain out of the market indefinitely.

Responsibility for Selling Below Cost

SELLING below cost is an economic sin which inevitably exacts its own penalties. No one, we believe, will openly attempt to justify it, for no one profits by it. Even the concern which ostensibly makes the "shrewd bargain" and secures goods below cost is piling up personal retribution through the general diminution of purchasing power which accompanies every "red ink" transaction.

Profits are the red corpuscles in the lifeblood of all business. When business becomes anaemic through loss of profits, all business suffers. For in these days of mass production and mass consumption there are few independent units remaining.

Who is to blame for selling below cost? Suppliers say it is the buyer who is taking advantage of present circumstances. Buyers say it is lack of courage on the part of suppliers. Members of both divisions of interest have been known to blame it on our anti-trust laws.

What about the responsibility of the "low cost" producer, whose price may represent a profit to himself but be utterly demoralizing to his industry as a whole?

The Business Convalescent

THE lack of business pick-up during the past few weeks has been discouraging to many, especially since it is recognized that the danger of a financial panic has been successfully passed. In this connection we must remember that American business and industry have just passed the crisis analogous to that of a man who has been seriously ill. Such a patient, after he is pronounced out of danger, has a lengthy period of convalescence ahead of him. Daily, or even weekly, gains are imperceptible. He cannot jump out of bed and resume customary activities.

What convalescing American business needs most now is the tonic of credit. Mr. Hoover and Congress have made it available to our business family doctors, the bankers. The sooner they get this tonic into the patient's system, the sooner will he be on his feet again.

Carbide Milling Is Reviewed

Possibilities of Welded Steel in Machine Design
Also Pictured at A.S.M.E.

TWO subjects of timely interest—the application of carbide cutters in milling operations and use of welded steel in machine tool construction—attracted a large attendance to the joint meeting of the Metropolitan and Plainfield sections of the American Society of Mechanical Engineers, held on the evening of March 17 at the Robert Treat Hotel, Newark, N. J. The meeting was under the auspices of the society's machine shop practice division. L. S. Ayer, factory manager, International Motor Co., Plainfield, N. J., was chairman.

Tungsten-carbide milling has passed the experimental stage, said Frank W. Curtis, research engineer, Kearney & Trecker Corp., Milwaukee, in his address on the "Use and Application of Tungsten and Tantalum Carbide for Milling." Some operations are impossible at this time, he said, but the rapid progress being made is gradually broadening the use of carbides for milling and the present limitations will be narrowed greatly as time goes on. Face milling with inserted-blade cutters is perhaps the most common class of tungsten-carbide milling at this time. Milling, he said, is without question one of the most practical applications for the new hard cutting materials.

Longer cutter life between grinds and greater output are the two major advantages of tungsten-carbide milling. Best results are obtained from milling machines basically designed for tungsten-carbide operation, although many existing machines perform favorably with such cutters. Use of old and dilapidated machines, however, is not practical.

Ample Support of Cutters Necessary

The outstanding foe of tungsten carbide is vibration, and so rigidity, not only of the machine, but of the fixture and the cutter is essential. In speaking of the necessity of providing ample support to the cutters, Mr. Curtis pointed out that any overhanging body has a certain amplitude of vibration; the larger the overhang, the greater the vibration. The rule is that the amplitude of vibration increases as the cube of the unsupported overhang; with twice as much overhang there would be eight times the vibration.

An important rule in using tungsten-carbide milling cutters is never to turn them backward. Because they operate so fast, it is possible to apply the wrong hand cutter without knowing that it is not correct. There is no better way to wreck a perfectly good cutter than to run it in the reverse direction, he said.

Another rule is: Always start a new operation slowly, not much faster than high-speed steel or stellite, increasing the feeds and speeds gradually until satisfactory performance is attained. Do not stop the spindle while the cutter is engaged in the cut. Always throw out the feed first; then let the cut run out before stopping the spindle, he said.

Several cases of savings by the use of tungsten-carbide cutters were cited by Mr. Curtis. In one case a scraping operation was eliminated due to the smooth finish obtained by the milling cutter. In another, two washing operations were eliminated on a piece that previously was disk ground, the tungsten-carbide milling not only making it unnecessary to wash out the abrasive dust, but also producing a better finish. In milling aluminum spirit levels, formerly disk ground, two rough polishing and one straightening operation were eliminated. With only a slight stoning an unusual polished-like surface is produced.

Less Material Left for Machining

In another case the scraping of ways and flat surfaces has been reduced to almost half that formerly necessary. In a number of tungsten-carbide milling operations it has been possible to combine roughing and finishing cuts. Other advantages include the fact that less material can be allowed for machining a given surface. Tungsten-carbide milling is not seriously affected by scale and the allowances of $\frac{1}{8}$ to $\frac{3}{8}$ in. in depth, can now be halved.

In speaking of tantalum carbide Mr. Curtis said: "Development of tantalum carbide for machining steel has been very rapid, and today it is quite possible to mill a great many steel parts with amazing feeds and speeds comparable to tungsten carbide.

"From experiments conducted to date, it seems that tantalum carbide does not have the high strength of tungsten carbide and for this reason the greatest limitation is the depth of cut. Undoubtedly this will be overcome in the near future, because the strength and resistance to wear of tantalum carbide are being increased very rapidly."

Mr. Curtis illustrated his talk by means of lantern slides and moving pictures showing interesting close-ups of the carbide milling of a wide variety of parts.

Box and Tubular Sections Available Through Welding

Speaking on "The Machine Tool of the Future, its Rigidity and Beauty,"

Everett Chapman, director of engineering and research Lukeweld, Inc., Coatesville, Pa., emphasized the fact that welded steel construction not only provides the best structural stiffness but also complete engineering freedom.

Machine tool loads are extremely complex, he said, and shapes should be used that are capable of resisting efficiently the loads in every direction and with every conceivable degree of eccentricity. It is significant to note, he said, that the choice of every good engineer, namely a box or tubular section, is available in every conceivable form through the use of the welding process. The most important characteristic of the closed tube or box to the machine tool builder is its torsional rigidity, these sections possessing the greatest amount of torsional strength for the least amount of metal. This, said Mr. Chapman, is the most neglected important subject in machine design.

Illustrating his talk by means of lantern slides, Mr. Chapman described a wide range of welded steel machines and machine parts. These included punch presses; a 500-ton forging press; a 42-in. planer, the housings, bed and table of which were made of welded steel; a 28-ft. long grinding machine bed; steel mill charging buggies, the weight of which were materially reduced by the welded steel construction; and welded steel gears. In discussing beauty he pointed out that there is beauty in anything that is fit; "it is fitness that you want to keep in mind when you criticize the beauty of welded steel parts," he said.

Features of Cast Designs Duplicated by Welding

F. T. Llewellyn, United States Steel Corp., New York, pointed out that beauty is a difficult thing to analyze and that one's ideas of beauty are largely a matter of habit. The sweeping curves and large round fillets in cast structures can be duplicated in welded steel, he said; and with a little care any machine could be designed with beauty of line and proportion.

Speaking from lantern slides, Milton Male, United States Steel Corp., described a wide variety of applications of welded steel in machine construction. These included photo-elastic studies, in color, of stress concentrations in welded structural members of various types, welded steel grinding machine pedestals, a large motor generator base; a shear frame that not only illustrated effective use of stiffener plates but that as an emergency job was completed two weeks sooner than the cast frame could have been furnished. Of interest also was a large welded steel drilling jig that in being portable, had to be of maximum lightness, and a layout table made up of welded steel plates and I-beams.

SUMMARY OF THE WEEK'S BUSINESS

Steel Industry Expects Seasonal Rise May Come in April

Ford Buying, Though Still Delayed, Looked for Soon—
Price Stabilization Program on Verge of Test

DESPITE the failure of steel business to improve during March, normally the month of peak operations, the industry is still looking forward to a seasonal rise of some proportions, and present indications are that it may come in April. Based on definite business that seems to be just around the corner, steel companies expect that the turn will come within the next two weeks.

Expectations of betterment are predicated on the fact that the Ford Motor Co. must soon release large orders if it is to attain a volume production schedule early in April, as now seems likely, and other automobile manufacturers, who are marking time pending the showing of the new Ford cars, probably will also release business that has been held back for weeks because of restricted output. Furthermore, a mild expansion is now taking place in orders for track supplies for laying of rails and for steel used in highway construction. Orders for structural steel and reinforcing bars for building work are more numerous, though not impressive as to tonnage.

Railroad buying may open up slightly upon completion of new financing through the Reconstruction Finance Corporation. A case in point is the application of the Baltimore & Ohio for a loan of \$55,000,000, which includes \$4,000,000 for betterments. The New York Central's long-delayed rail inquiry may appear next week, but will be for only 30,000 tons.

THE Ford Motor Co., though still withholding expected large orders for sheets and strip steel, has placed some small contracts, including one for 20,000 die-rolled front axles, which is affording an increased operation at the Republic steel mill at Buffalo this week. Only at Buffalo and to a lesser extent at Pittsburgh have steel-making operations gained, and these increases are offset by declines elsewhere, notably at Cleveland and in the Valleys, leaving the average rate for the country at 25 per cent of capacity, unchanged from last week.

The Ford schedule of production may be expanded next week to 500 cars a day, and possibly as many as 1000 a day may come off the assembly lines within two weeks. Receipt of steel releases from Ford would be immediately reflected in steel-making operations. An improvement in pig iron shipments from Cleveland furnaces has resulted from a few orders for castings for Ford cars that have been placed within the past few days.

SOME stimulation of steel orders is expected next week as a result of the announced price advances that are to go into effect on bars, plates, shapes, sheets,

hot and cold-rolled strip steel and bolts and nuts on April 1. Although many steel companies have been quoting the higher prices for two weeks or more on current business, there has been little test owing to extensive contract coverage for first quarter. Notwithstanding the apparent determination of the steel companies to maintain the higher price levels, many buyers are still skeptical of their ability to hold an advance in the face of greatly restricted business. Thus far there has been little to indicate how extensively buyers may specify against their expiring contracts.

Efforts to strengthen prices are complicated at seaboard points on account of growing foreign competition. Bars from Europe are being laid down in New York in increasing quantities at 1.20c. to 1.50c. a lb., while foreign steel is being freely offered to buyers on the Pacific Coast at 1.50c. a lb., delivered. A New York contracting company put in a bid of 1.67½c. a lb., delivered, on plates and angles, a price so low that it suggests the possible use of foreign steel, against which there is no restriction in New York City work. English makers of cotton bale ties have usurped the competitive position on that product occupied in recent years by Germany, and are quoting 75c. per 45-lb. bundle, delivered Gulf ports, considerably below last year's prices.

STABILIZATION of steel prices has been furthered by the adoption of a delivered base price on bars at Detroit, which has been for some time the focal point for the country's lowest quotations. Some of the automobile companies are said to have approved the new plan, by which all steel companies, regardless of the distance of their plants from the automobile manufacturing district, will sell on an even delivered basis, though their f.o.b. mill prices will naturally vary.

Pending the complete establishment of some of the higher prices now quoted, THE IRON AGE finished steel composite price is unchanged at 2.044c. a lb. Raw materials are lower, the composite price for pig iron now being \$14.43 and that for steel scrap \$8.21. The pig iron composite is the lowest since September, 1915, while that for steel scrap breaks all records.

STEEL companies are adding a clause to their contracts by which the proposed sales tax would be passed on to the consumer. Railroads are seeking exemption from the sales tax, which they cannot pass on, and their position is said to be sympathetically approved by some of the steel companies, which fear that the carriers will continue to restrict their purchases closely if they are forced to absorb the tax.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:

	Mar. 22, 1932	Mar. 15, 1932	Feb. 23, 1932	Mar. 24, 1931
No. 2 fdy., Philadelphia	\$15.59	\$15.59	\$15.59	\$17.76
No. 2, Valley furnace	15.00	15.00	15.00	16.50
No. 2 Southern, Cin'ti.	13.82	13.82	13.82	14.19
No. 2, Birmingham	11.00	11.00	11.00	12.00
No. 2 foundry, Chicago*	16.50	16.50	16.50	17.50
Basic, del'd eastern Pa.	16.00	16.00	16.25	17.25
Basic, Valley furnace	14.50	14.50	14.50	16.50
Valley Bessemer, del'd P'gh.	17.39	17.39	17.39	18.76
Malleable, Chicago*	16.50	16.50	16.50	17.50
Malleable, Valley	15.50	15.50	15.50	17.00
L. S. charcoal, Chicago	23.17	23.17	23.17	25.04
Ferromanganese, seab'd car-lots	75.00	75.00	75.00	80.00

*The average switching charge for delivery to foundries in the Chicago district is 6¢ per ton.

Ferromanganese quotations adjusted to carload unit; larger quantities at discount.

Rails, Billets, etc.

Per Gross Ton:

	Mar. 22, 1932	Mar. 15, 1932	Feb. 23, 1932	Mar. 24, 1931
Rails, heavy, at mill	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill	34.00	34.00	34.00	36.00
Rerolling billets, Pittsburgh	27.00	27.00	27.00	30.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	30.00
Slabs, Pittsburgh	27.00	27.00	27.00	30.00
Forging billets, Pittsburgh	33.00	33.00	33.00	36.00
Wire rods, Pittsburgh	37.00	37.00	37.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.50	1.50	1.50	1.60

Finished Steel

Per Lb. to Large Buyers:

	Mar. 22, 1932	Mar. 15, 1932	Feb. 23, 1932	Mar. 24, 1931
Bars, Pittsburgh	1.50	1.50	1.50	1.65
Bars, Chicago	1.70	1.70	1.60	1.70
Bars, Cleveland	1.65	1.65	1.55	1.70
Bars, New York	1.85	1.85	1.85	1.98
Tank plates, Pittsburgh	1.50	1.50	1.50	1.65
Tank plates, Chicago	1.70	1.70	1.60	1.70
Tank plates, New York	1.798	1.798	1.798	1.93
Structural shapes, P'gh	1.50	1.50	1.50	1.65
Structural shapes, Chicago	1.70	1.70	1.60	1.70
Structural shapes, New York	1.76775	1.76775	1.76775	1.9012
Cold-finished bars, Pittsburgh	2.00	2.00	2.00	2.10
Hot-rolled strips, Pittsburgh	1.40	1.40	1.40	1.55
Cold-rolled strips, Pittsburgh	2.00	2.00	1.90	2.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel

Per Lb. to Large Buyers:

	Mar. 22, 1932	Mar. 15, 1932	Feb. 23, 1932	Mar. 24, 1931
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.20	2.20	2.15	2.25
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.30	2.30	2.30	2.35
Sheets, galv., No. 24, P'gh	2.85	2.85	2.75	2.90
Sheets, galv., No. 24, Chicago dist. mill	2.95	2.95	2.85	3.00
Hot-rolled sheets, No. 10, P'gh	1.55	1.55	1.60	...
Hot-rolled sheets, No. 10, Chicago dist. mill	1.65	1.65	1.70	...
Wire nails, Pittsburgh	1.95	1.95	1.95	1.90
Wire nails, Chicago dist. mill	2.00	2.00	2.00	1.95
Plain wire, Pittsburgh	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.25
Barbed wire, galv., Pittsburgh dist. mill	2.60	2.60	2.60	2.55
Barbed wire, galv., Chicago dist. mill	2.65	2.65	2.65	2.60
Tin plate, 100 lb. box, P'gh	\$4.75	\$4.75	\$4.75	\$5.00

Old Material

Per Gross Ton:

	Mar. 22, 1932	Mar. 15, 1932	Feb. 23, 1932	Mar. 24, 1931
Heavy melting steel, P'gh	\$10.25	\$10.25	\$10.25	\$12.75
Heavy melting steel, Phila	7.25	7.37 1/2	7.37 1/2	10.50
Heavy melting steel, Ch'go	7.12 1/2	7.12 1/2	7.12 1/2	10.00
Carwheels, Chicago	7.00	7.00	7.50	9.50
Carwheels, Philadelphia	9.50	9.50	10.50	13.50
No. 1 cast, Pittsburgh	9.50	9.50	9.75	12.50
No. 1 cast, Philadelphia	10.00	10.00	10.00	11.50
No. 1 cast, Ch'go (net ton)	7.00	7.00	7.50	9.50
No. 1 RR. wrot., Phila	8.50	8.50	8.50	12.00
No. 1 RR. wrot., Ch'go (net)	5.50	5.50	6.50	8.25

Coke, Connellsville

Per Net Ton at Oven:

	Mar. 22, 1932	Mar. 15, 1932	Feb. 23, 1932	Mar. 24, 1931
Furnace coke, prompt	\$2.25	\$2.25	\$2.25	\$2.50
Foundry coke, prompt	3.50	3.50	3.50	3.50

Metals

Per Lb. to Large Buyers:

	Mar. 22, 1932	Mar. 15, 1932	Feb. 23, 1932	Mar. 24, 1931
Lake Copper, New York	6.12 1/2	6.12 1/2	6.50	10.12 1/2
Electrolytic copper, refinery	5.75	5.75	6.00	9.75
Tin (Straits), New York	21.75	21.65	22.25	26.90
Zinc, East St. Louis	2.77 1/2	2.80	2.82 1/2	4.00
Zinc, New York	3.14 1/2	3.17	3.19 1/2	4.35
Lead, St. Louis	3.00	3.00	3.55	4.25
Lead, New York	3.15	3.15	3.75	4.50
Antimony (Asiatic), N. Y.	6.12 1/2	6.20	6.75	7.25

▲▲▲ The Iron Age Composite Prices ▲▲▲

Finished Steel

March 22, 1932

2.044c. a lb.

One week ago

2.044c.

One month ago

2.037c.

One year ago

2.142c.

Base on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.

	HIGH	LOW
1922	2.044c., March 8;	2.037c., Jan. 19
1921	2.142c., Jan. 13;	2.052c., Dec. 29
1920	2.362c., Jan. 7;	2.121c., Dec. 9
1929	2.412c., April 2;	2.362c., Oct. 29
1928	2.391c., Dec. 11;	2.314c., Jan. 3
1927	2.453c., Jan. 4;	2.293c., Oct. 25
1926	2.453c., Jan. 5;	2.403c., May 18
1925	2.560c., Jan. 6;	2.396c., Aug. 18

Pig Iron

\$14.43 a Gross Ton

14.47

14.47

15.71

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap

\$8.21 a Gross Ton

8.25

8.25

11.08

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

High

\$8.21

Mar. 22

8.50

Dec. 29

11.33

Jan. 6

8.50

Dec. 9

15.00

Feb. 18

11.25

Dec. 3

17.58

Jan. 29

14.08

Dec. 3

16.50

Dec. 31

13.08

July 2

19.71

Jan. 4

17.54

Nov. 1

15.25

Jan. 11

Pittsburgh Steel Makers Still Expect Spring Rise, Probably in April

PITTSBURGH, March 22.—While Pittsburgh mills report no noticeable change in steel releases, the recent setback in specifications seems to have been checked. Automobile tonnage is still lacking, but miscellaneous demand is holding up and sentiment still favors a change for the better within the next fortnight.

Failure of business to show any improvement during March has been very discouraging, but local steel executives are so certain that present minimum demand cannot continue much longer that most of them expect a spring rise in business somewhat later than usual.

Structural awards in the past week have been more numerous, although tonnage is still well under that of 1931. Railroad buying is still in the offing, and no definite line pipe inquiry has appeared.

With the principal tonnage outlets dormant, the steel industry is thought to be making a good showing considering conditions. Under the circumstances, resumption of buying by the automobile industry will make itself felt immediately, and local companies are relying heavily on this demand to bring about improvement next month.

Price stabilization is still being sought on the principal finished steel products, and recently named quotations are holding on such new business as is being placed. However, consumers are apathetic as to their forward needs, and adequate price tests are still lacking on most products. Small lots of sheets are being sold at the current asking prices, and bids on the Pennsylvania license plate stock developed only one deviation from the quoted price. Establishment of a Detroit delivered price on bars has met with favorable reaction from Pittsburgh companies. Quotations on the heavy hot-rolled products are generally being maintained. Nails and wire are particularly well held, and discounts on bolts are more regular than has been the case for several months.

Steel ingot production in the Pittsburgh district has regained some of last week's losses, and is estimated at 23 per cent of capacity. However, production in the Valleys has dropped to 25 per cent, and this figure is being maintained only by the steady schedules of the leading interests.

In the Wheeling district output is

No noticeable change in the volume of steel releases, but trade expects seasonal improvement to assert itself in April.

* * *

Automobile buying will affect steel mill schedules almost immediately.

* * *

Higher steel prices, recently announced, are holding on minor transactions, but have received no adequate test.

* * *

Steel ingot production at Pittsburgh has regained some of last week's losses, but Valley output is lower.

* * *

unchanged. Tin mill schedules are slightly higher, but finishing mill output otherwise is about the same as last week.

Pig Iron

A steel company in the Valley has purchased a small tonnage of basic iron at an unnamed price. However, this transaction disposed of the last stock of a merchant producer and can hardly be considered representative of the market. No other sales are reported, and the foundry melt in the district is still at a minimum. A merchant furnace in the Valleys has been blown out after a short run. Prices are nominally unchanged in the absence of sizable transactions.

Semi-Finished Steel

Shipments are still light, and no second quarter contracting is reported. Prices on billets, slabs and sheet bars range from \$26 to \$27, Pittsburgh or Youngstown, with some effort being made to establish the higher figure. Forging billets are unchanged at \$33, Pittsburgh. Second quarter contracting on wire rods is progressing satisfactorily, with the price well maintained at \$37, Pittsburgh.

Rails and Track Supplies

Significant purchases by the railroads are still being delayed, and rail inquiry by the leading Eastern carriers has not appeared. Mills have accumulated a little tonnage for April rolling, but not enough to justify anything approaching full schedules. Specifications for track accessories

are light, but are expected to improve with the coming of open weather.

Bolts, Nuts and Rivets

Producers are succeeding in booking a little second quarter tonnage, and recently named prices are gradually being established. Bolts are quoted at 75 per cent off list, large rivets at \$2.25 a 100 lb., and rivets 7/16 in. and smaller at 70, 10 and 5 off list. Specifications of a few makers are running slightly ahead of those of February.

Bars, Plates and Shapes

Considerable interest is attached to the establishment of a Detroit delivered price on bars at \$4 a ton over the Pittsburgh quotation. Local producers have generally accepted the new setup and are quoting on that basis for the second quarter. A differential of \$5 a ton over Pittsburgh is to apply on shipments to cities in Michigan outside the Detroit switching district, but in the automobile manufacturing area. While this setup will still force Pittsburgh mills to absorb a part of the freight rates in making shipments into Michigan, it will enable them to compete against water shipments in the summer months, and also provide a clear cut price level which has been almost entirely lacking in the last year. The 1.60c., Pittsburgh price on bars, plates and shapes, which was named earlier in the month for second quarter, is being rather generally adhered to, and will receive a thorough-going test in the next week. Practically all new quotations are being made at this level, and the price seems likely to be established on new business in the coming quarter.

Structural inquiry is expanding, particularly from the standpoint of variety and number of jobs coming out. The tonnage is rather disappointing, but the larger fabricators have this year been quoting on only about 50 per cent of last year's volume. The smaller interests have practically no backlog tonnage, and a number of shops may be closed during the summer months. Demand for plates shows no change, and steel bars are adversely affected by lack of activity in the automobile industry. However, parts makers are placing a little tonnage, some of which is being shipped immediately. Releases of reinforcing bar tonnage are improving, but inquiry has not been so active in the last week.

Cold Finished Steel Bars

Output has not improved, but a little second quarter contract business is being booked. Production continues at recent low levels. The price in this district is well maintained at 2c., Pittsburgh.

Tubular Goods

The recent inquiry for 200 miles of 20-in. line pipe, issued by Brokaw, Dixon, Garner & McKee, New York, is now definitely known to have referred to the extension of a gas pipe line from Muncie, Ind., to Detroit, for the Columbia Gas & Electric Co. However, details of franchise have not yet been arranged, and it may be some time before the line is purchased. No other inquiry has appeared, and demand for standard pipe is only very slightly better. Consumption of tubular goods in the oil fields shows no change, and pipe production generally shows no improvement.

Wire Products

Business from the merchant trade is increasing in volume, although manufacturers' wire is still rather dull. Jobbers are also showing more willingness to contract for second quarter, and the price situation is unusually satisfactory. Nails are quoted at \$1.95 a keg, Pittsburgh, and plain wire at 2.20c., Pittsburgh.

Sheets

Miscellaneous releases were slightly better last week, but the automobile industry failed to provide any tonnage. Some of the parts makers serving the Ford Motor Co. have issued specifications, but no tonnage is reported as having come directly from the Ford interests. The volume of sheet steel going to electric refrigerator makers is holding up and tack plate is active, reflecting the comparatively high operations of the boot and shoe industry. The other principal consuming lines are quiet.

Sheet prices continue to gain strength, but buyers are apathetic as to their future needs and little test of quotations is offered except on spot orders for immediate shipment. Some large consumers are also covered for several weeks at old figures. Sheet makers are not considering the establishment of a Detroit base, as was done recently for bars.

Tin Plate

The industry has regained the loss in operations suffered recently and production currently ranges from 40 to 45 per cent. One large producer is running at 80 per cent. Shipments are showing some improvement over those of the preceding month, but are still behind seasonal expectations.

Strip Steel

This market still reflects lack of automobile buying and releases last week showed little improvement over the recent low rate. Mill operations for the industry are not above 20 per cent, with cold-rolled strip hardly ap-

proximating that figure. However, prices seem to be gaining strength on both hot and cold-rolled strip. The latter is fairly well established at 2c., Pittsburgh, and introduction of \$4 a ton differential over Pittsburgh at Worcester has improved the situation in the East. On hot-rolled material, prices range from 1.40c. to 1.50c., Pittsburgh, on wide sizes and 1.50c. to 1.60c. on the narrow.

Old Material

The scrap market has been very

dull in the last week, with no substantial consumer purchases reported. However, no surplus scrap is being accumulated, as dealers are still able to ship to a number of consuming points. Most of them are paying \$10 and \$10.25 for No. 1 heavy melting steel to cover the most recent orders taken, and prices are quoted unchanged. The other grades are generally quiet. The market on sheet bar crops has almost disappeared, and this grade of scrap is available at the same price as steel.

New York Steel Market Still Disturbed by Foreign Steel

City Contractor Bids 1.67½c. a Lb., Delivered, on Plates and Angles—New York Central to Buy 30,000 Tons of Rails

NEWS YORK, March 22.—Eastern plate mills are notifying their customers that their second quarter contract price will be 1.70c., Coatesville, following the advance to 1.60c., Pittsburgh, recently announced by makers in Pittsburgh and Cleveland. Some mills are declining to take any new business at the old price for delivery in the second quarter. Contract buyers will be able to specify up to the end of this month against their first quarter coverage.

Although all makers are showing a determination to adhere rigidly to the new prices now affecting bars, shapes, plates, sheets, hot and cold-rolled strip and bolts and nuts, the situation is not being given much of a test, as requirements of consumers are so small. Mills have been trying to obtain specifications against expiring first quarter contracts, but without much success. Jobbers, in particular, are averse to ordering more than they actually need, even to save money. Skepticism among buyers as to the ability of the mills to maintain the advances in the face of such a small volume of buying may be one of the causes for the lack of interest in specifying.

Foreign steel continues to be a disturbing influence in the local market. Jobbers are carrying considerable stocks of imported bars, which can be laid down in New York at 1.20c. to 1.50c. a lb. The Department of Purchases, New York, has taken bids on 120 tons of plates and 56 tons of angles for repair work on Queensborough bridge, the low bidder being the Seaboard Contracting & Supply Co., New York, whose price was 1.67½c. a lb., delivered at the job, a price so low that it is presumed that the company will furnish foreign steel, against which there is no restriction in New York City work. Deducting \$1 a ton for trucking, the price on the plates would figure back to 1.427c. a lb., Coatesville, Pa.

The New York Central Railroad probably will inquire next week for 30,000 tons of rails, and expects to lay an additional 20,000 tons, part of which is already on the ground and the remainder will be specified against an used portion of the 1931 contract.

Pig Iron

Forward buying so far in March has been practically absent. Spot orders are consequently more numerous, but the total volume of business is still small. Bookings in the past week aggregated about 2500 tons, the same total as in each of the two preceding weeks. Foundry melt is still at a low point. With few exceptions, district foundries are operating only two to three days a week. Prices on domestic brands are unchanged. Southern iron is coming into this district in negligible quantities. Offering of an 800-ton cargo of Royal Dutch iron, which is expected to arrive at Hoboken next week, has brought little response from consumers.

Reinforcing Bars

Bar mills have stressed the fact to local distributors that the new price of 1.60c., Pittsburgh, or 1.95c., New York, which became generally effective yesterday, will be firmly maintained. Actual test of the advanced base, however, is not in early prospect in view of the dearth of new construction work in the district. Contract for 825 tons of bars for the section of West Side elevated highway from Twenty-second to Thirty-eighth Street was awarded last week to Kalman Steel Corp. This business is understood to have been placed at 1.70c., delivered, which included an extra of 20c. for size. It is further understood that the bars will be shipped by barge from Buffalo. Were the bars to come from Pittsburgh on an all-rail freight rate, a quotation of 1.15c. would have been necessary to meet this price.

Chicago Iron and Steel Markets Hold to an Even Course

CHICAGO, March 22.—The local iron and steel market continues to hold an even course, with ingot production remaining close to 24 per cent of capacity. New sales in finished steel are spotty and, with the exceptions of wire products and sheets, there is virtually no interest in forward commitments. Individual specifications are small and the variation in output among the mills is measured largely by the willingness of the seller to accommodate rolling schedules to the character of the business offered. The future remains clouded in almost every phase of the market. A heavy snow storm may have the effect of slowing deliveries to some points. However, at this time of year there are not the low temperatures that prolong the effects of a severe storm.

The nearness of the active outdoor work season is reflected in growing interest in reinforcing bars and center strips for road work and a continued growth in releases of track accessories that are now being distributed to points of use along the railroads. Building programs are lagging, with little immediate prospect of improvement. The trend in this market is clearly shown by the recent liquidation of two fabricating shops in Chicago. A few small orders are now drifting in from railroad shops, and there is growing interest in a few short pipe line projects. In the meantime, pipe manufacturing in this district is at a standstill.

Considering the pressure still exerted by some buyers, prices are holding satisfactory. Most contracts are now being made with supplementary clauses which pass sales taxes to the consumer if these taxes exist at the time of billing.

Pig Iron

Although forward buying is gaining headway, the present situation cannot be characterized as a buying movement. One of the largest transactions in months has been closed for Northern foundry iron, and a few sizable inquiries are still before the trade. Shipments continue to hold a moderate lead over the February rate. Small orders are taking on the appearance of fill-in tonnages, indicating that few foundries have pig iron on the ground. Releases of spiegeleisen from local docks are heavier. Prices for Northern foundry iron are weak at \$16.50 a ton.

Improvement occurs in orders for steel for road work and for track laying, but otherwise market holds to its recent course, with outlook still uncertain.

* * *

Contracts are being made with clause which passes any sales tax on to the buyers.

* * *

Northern pig iron prices weak at \$16.50, base.

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Bolts, Nuts and Rivets

Contracting is well under way and little resistance is being offered to the new price schedules. Specifications remain light.

Reinforcing Bars

Dealers are standing by in as dull a period as this market has experienced in many years. Fresh inquiries are limited to a few small post office projects. Orders for bars for road work are being delayed somewhat by the uncertainty of the weather. The price situation is not yet clearly defined because dealers' prices lack tests. Mills are talking of price advances of \$2 a ton to dealers when second quarter contracts are signed. Warehouse price policies will be determined by the final action taken by producers.

Rails and Track Supplies

This market remains quiet except for rather a steady run of releases for track fastenings which will soon be needed for track laying operations and maintenance programs. There appears to be nothing to substantiate reports that the Chicago & Alton is prepared to enter the market for 7000 tons of rails, although this is about the tonnage that the Alton has in mind for an eventual program. The Milwaukee Road is continuing its policy of taking out small tonnages from time to time. The New York, Chicago & St. Louis has let a general award for grading for extension of its Chicago switching yard. Output of rails remains very low, with only one unit producing. This mill has a three weeks' schedule at its present rate.

Plates

Practically every phase of plate demand is quiet. The Wheeling & Lake Erie has taken bids on 100 gondolas. In the West there is not a whisper of what may be expected in the railroad equipment market. Tank inquiry of size is wholly lacking. The New York Central will open bids March 31 on second quarter requirements of plates, shapes and bars. A few small orders are now drifting in from local railroad shops. Orders of this kind are seldom large, except when railroads are building their own cars, and therefore little support for the market can be expected from that source.

Structural Material

The construction outlook is drab. Awards during the week amounted only to a handful. Most of the pending work has been on the fire for some time. It is for the most part a tonnage here and there for use in post office structures. Contractors are reaching far-afield, as for instance, a local builder has taken the contract for the Sacramento, Cal., Post Office and a Chicago contractor is low on the Detroit Post Office.

Cast Iron Pipe

Prices continue to be pressed down as foundries are extremely hungry for business. For cast iron pipe to be delivered to Chicago, quotations are \$28 to \$30 a ton, Birmingham, for diameters 6 in. and larger. Small inquiries are somewhat more numerous and the outlook for larger business seems to be improved, following favorable developments in the bond market. Wilmette, Ill., is preparing to finance its new water pumping and treating plant.

Bars

A few miscellaneous orders from railroad shops and road machinery builders and the prospects of second quarter buying by the New York Central are the only highlights in this market. Automobile manufacturers continue to lag in their use of this commodity, and farm implement builders have all but stopped operations. Interest in future commitments is practically non-existent. Rail steel bar mills are producing from 30 to 35 per cent of capacity. Orders are small and for prompt delivery, thereby making satisfactory operating

schedules almost out of the question. The fence post movement is light for the reason that jobbers are not selling stocks they accumulated last year.

Wire Products

A few second quarter contracts have been closed and sellers are hopeful that this list will grow materially before the end of the month. Prices are holding both on future commitments and spot business. Shipments to manufacturers and jobbers are small and at frequent intervals, indicating that there is no important change from the policy of holding stocks at the minimum.

Warehouse Business

Deliveries are handicapped by a heavy March snow. Prices remain steady.

Sheets

Forward contracting is under way in small volume. Spot purchases and shipments show moderate gain, resulting in somewhat better operating schedules.

Old Material

Inquiries and sales of carlots remain fairly active, but interest in tonnages is almost wholly lacking. March is proving to be a very poor month in the scrap business. The volume of sales is continuing its downward trend. Railroad offerings remain light and there is other evidence that available supplies are low. The Illinois Central is not gathering scrap and the Milwaukee Road has withdrawn a list offered last week. A heavy spring snow is retarding the handling and preparation of scrap.

Cincinnati Pig Iron Melt Has Slackened

CINCINNATI, March 22.—Moderate interest in second quarter pig iron needs developed the past week with the receipt of two inquiries for 500 and 300 tons respectively from Ohio consumers. Other pending business is for small quantities. Fresh bookings totaling less than 1000 tons were all in carload lots. Shipments against contracts are at a steady rate, although a slight lowering of the melt has been reported.

Steel

Small improvement in sheet demand from other users than automobile manufacturers the past week will be reflected in heavier rolling schedules this week. Production will be close to 40 per cent. Some orders for second quarter have been received.

Old Material

Small amounts of steel, borings and turnings are moving on contract. Prices are unchanged.

Eastern Pennsylvania Markets Have Not Shaken Their Inertia

Operations of Steel Mills Have Declined This Month—Makers Proceed in Price Stabilization Efforts

PHILADELPHIA, March 22.—The continued inertia of the market has developed growing concern in the trade. Sentiment has risen on several occasions in the belief that new business was about to come to the mills. But its failure to materialize has created a feeling of genuine disappointment, which has been intensified perhaps by the fact that March is generally the month of greatest production. Operations in this district actually have been scaled down almost from the beginning of March and now are estimated at about 15 per cent.

The hope still prevails, however, that new business is near at hand and can be taken at higher prices. Makers of sheets, plates, bars and shapes are seeking to make the increased prices effective, though conceding that the test remains to be applied.

Pig Iron

The dullness of the market remains unbroken. The only tonnages moving consist of carlots of foundry and low phosphorus iron. The Bureau of Supplies and Accounts, Navy Department, will open bids next Tuesday for 224 tons of No. 1X foundry iron and for 25,000 lb. of standard ferromanganese for the Norfolk, Va., yard.

Plates, Shapes and Bars

The higher price of 1.60c., Pittsburgh, which most makers are quoting, has driven in some coverage against contracts of 1.50c., though the quantity is light. One policy is to wait till April 15 before applying the new level, so that regular customers will have additional time to cover at the old price. But on new accounts the higher quotations now prevail. McClintic-Marshall Corp. was awarded 2700 tons for the Reading Railroad electrification project on its Norristown branch.

Sheets

Makers are exerting a strong effort to stabilize the market at the higher quotations which, on the Pittsburgh basis, are 2.85c. for No. 24 galvanized, 2.20c. for No. 24 hot-rolled annealed and 1.70c. for No. 10 hot rolled and annealed. The lack of response to the quotations leaves uncertainty as to when a test will develop. Indications are, however, that mills generally are holding well to the new levels for new business. Disap-

pointment is felt over the failure of the Ford Motor Co. to come into the market for important tonnages.

Warehouse Business

Jobbers report extremely light demand. Galvanized sheets are down \$5 a ton to 3.50c. and are only \$2 over black sheets.

Imports

Imports last week were: Iron ore from England, 25 tons; steel strips from England, 6 tons; band steel from France, 25 tons; steel bars from France, 10 tons; steel bars from Belgium, 27 tons; structural shapes from Belgium, 5 tons; structural shapes from France, 31 tons.

Old Material

Mills continue to hold up shipments and the market is dragging in consequence.

Algoma Rail Mill Has Resumed Operations

TORONTO, March 21.—The rail mill of the Algoma Steel Corp., Sault Ste. Marie, Ont., resumed operations on March 14 upon receipt of an order from the Canadian Pacific for Western delivery. The run will likely last for about two months. In addition to the rail mill, both merchant mills are operating as well as several open-hearts and one blast furnace. Orders received and in prospect from the Ford Motor Co. of Canada are expected to have an important bearing on Algoma's operations this year. Other business of a smaller nature also are being received.

Pig Iron

Sales are holding around 500 tons a week, made up of individual orders of single car lots. Melters are showing no interest in forward purchases. Prices are unchanged.

Old Material

Consumers are taking iron grades with machinery cast the most active, followed by stove plate and wrought scrap. Other lines are spotty. There is practically no movement in steel grades in the Toronto or Montreal Districts. Prices are unchanged.

Cleveland Mill Operations Sag; Ford Buying Still Delayed

Motor Car Manufacturers Are Marking Time with Respect to Steel Purchases—Pig Iron Slightly Stimulated

CLEVELAND, March 22.—The volume of steel business in this territory is very light, having shown little change in the past two weeks. Steel plant operations in Cleveland have again declined with the shutting down of one open-hearth furnace. These plants are operating this week at 35 per cent of ingot capacity.

While the release of some orders for small castings by the Ford Motor Co. has given a slight stimulus to the demand for pig iron, the Ford company is still withholding orders for round tonnages of sheets and strip steel, and other motor car manufacturers continue to mark time. Consumers outside of the motor car field are not showing signs of increased activities.

With the end of the quarter near at hand, specifications for steel bars, plates and shapes against existing contracts have been stimulated in a few cases by the announced price advances. However, consumers do not appear enough interested as yet in second quarter contracts to sound out the market for that delivery, and skepticism exists among buyers as to whether the advances will hold in spite of the apparent determination of producers to maintain them. While the new prices on sheets are being quoted on new business, there has not been a test either of these or of strip prices for the second quarter.

There have been rather sharp reductions on ferrophosphorus.

Pig Iron

The placing of two or three sizable orders for car parts by the Ford Motor Co. has resulted in some new pig iron releases, and shipping orders from some other sources in the motor car field showed a slight gain the past week. However, shipments so far this month are slightly below those of February owing to the recent slowing down of some of the motor car manufacturers. Sales continue light. With lack of firmness due to competition of producers for business outside of their own territories, consumers are buying only for their early needs. The 50c. reduction to \$15.50, Cleveland, for foundry and malleable iron has not stimulated local sales. Prices for outside shipment depend on the delivery point.

Semi-Finished Steel

Some scattered orders for current needs are being placed, but consumers

are showing no interest in second quarter contracts. A local mill quotes sheet bars, slabs and large billets at \$26, Cleveland and Youngstown, for the second quarter.

Iron Ore

Lake ore consumed in February amounted to 1,158,792 tons, a gain of 5232 tons over January. This compares with 2,368,243 tons consumed in February last year. Furnace stocks March 1 amounted to 29,973,085 tons and there were 35,742,145 tons on docks on that date, compared with 34,257,887 tons on the same date a year ago. Central district furnaces consumed 588,033 tons in February, an increase of 27,317 tons; Lake front furnaces melted 551,923 tons, a decrease of 21,492 tons; all rail furnaces used 15,561 tons, a decrease of 879 tons, and Eastern furnaces melted 3275 tons, an increase of 286 tons. There were 55 furnaces in blast using Lake ore March 1, a decrease of one for the month.

Sheets

Orders for 400 tons of black sheets were placed by steel barrel makers during the week and fair-sized lots for tin mill black plate came from Ohio makers of kitchen utensils. However, there was little business from the motor car industry and the aggregate tonnage was light. Most of the business was in specifications against old contracts. The new prices are being held on all new business, although orders are not large enough to furnish a good test of prices.

Strip Steel

The market on hot and cold-rolled strip continues dull, although a few orders for hot-rolled material were placed during the week by the motor car and agricultural implement industries. Some of the leading manufacturers of automobile accessories using hot-rolled strip are operating this month at a lower capacity than in February. There has been little test of the \$2 a ton advance on hot-rolled strip to 1.50c. and 1.60c., Pittsburgh, for small consumers and to 2c., Cleveland, on cold-rolled strip.

Bars, Plates and Shapes

Activity in these products continues light. Two western Pennsylvania highway bridges, requiring 1640 tons of structural shapes and 170 tons of reinforcing bars, have been placed by a Cleveland contractor. Little new in-

quiry is coming out in the structural field. The price advances to 1.65c., Cleveland, for steel bars and to 1.60c., Pittsburgh, for plates and shapes have held for some new business in small lots, although most consumers are under contract at the old prices. A local mill announces that it will adhere to the new method of quoting steel bars for delivery in the Detroit territory, providing the plan becomes generally effective. However, this has been given no test.

Bolts and Nuts

Manufacturers report that they have met little resistance to the advance in price to 75 per cent discount and that many consumers have signed second quarter contracts on that basis. Business continues light in volume. Makers are adding a new clause to their contracts stipulating that, in case of the application of a Federal sales tax, the amount of the tax shall be added to the invoices.

Old Material

A Valley district mill has purchased 2000 tons of machine shop turnings at \$7.50, but is not yet taking shipments. Dealers are buying No. 1 heavy melting steel at \$7.50 in limited quantities for delivery to a Cleveland consumer. Very little scrap is being taken by either Cleveland or Valley mills. While prices are unchanged, the market shows a softening tendency.

Pacific Coast Prices Are Strengthening

SAN FRANCISCO, March 22.—The Columbia Steel Co. will supply 6250 tons of material for the Los Angeles Times Building, which will be fabricated by the Consolidated Steel Co. For the past week total contracts reported involve 8500 tons, with 2600 tons added to the pending list.

Mill prices are reported to be holding with comparative firmness. A concerted attempt is being made to adjust the market for reinforcing bars in southern California, where disturbed conditions have existed for the past 90 days. The open market is reported as low as \$30 a ton for imported steel and only a slight differential for domestic bars in carload lots, delivered at Los Angeles harbor. To be in line with other products, bars should hold at \$42 a ton.

Railroad Equipment

Five railroad locomotives, all of steam type, and four for export, were shipped in February, as against none in January, according to reports received by the Bureau of the Census from manufacturers.

Alaska is inquiring for 10 hopper bottom cars for coal and ballast service.

Detroit Base on Steel Bars Is Expected to Stabilize Market

Plan Is Now in Effect for Second Quarter Business, With 1.80c. a Lb. Quoted for Detroit Delivery

DETROIT, March 22.—Steel bar makers see in the application of a delivered price at Detroit of \$4 a ton above the Pittsburgh base price the most encouraging effort yet made to stabilize the local market which recently has been the meeting place for the country's lowest prices. The new plan, already put into effect on second quarter business, calls for a delivered price of \$1 a ton above that at Detroit for consumers outside of this city, but within a short radius of it. Users at Port Huron, Flint, Pontiac, Jackson, Ann Arbor and Monroe would be among those to benefit from this arrangement. Automobile companies farther distant from Detroit, such as at Muskegon, Kalamazoo, South Bend, Auburn, Connersville and Hamilton, Ohio, will continue to pay the same freight rate as heretofore from their nearest source of supply.

This zoning scheme, with one zone for the metropolitan Detroit area and another for cities within 50 to 75 miles of Detroit, sets up steel users in the automotive industry on a more equal price basis than in the past, so far as steel freight rates are concerned. It is estimated that the plan will embrace a territory in which 85 to 90 per cent of the country's motor cars are made. If the plan works out as anticipated, no longer will steel consumers at Detroit have \$3 and \$4 a ton advantage in delivered price over those at points to which it is impossible to ship steel by water. The differential in the future will be only \$1.

The new price basis will take the place of several methods now in use of quoting at Detroit. Companies in a position to deliver steel by boat have sometimes quoted a Pittsburgh base price plus the water transportation cost from the mill to this city. This usually meant a concession of \$2 a ton from the all-rail delivered price. Then, the local market has become more competitive in the past year by the construction of two bar mills by Great Lakes Steel Corp., at Ecorse, Mich., a few miles below Detroit on the Detroit River. Naturally these mills are in a position to make quick delivery to consumers nearby.

It will be recalled that in the summer of 1931 an attempt was made to establish Detroit as a basing point for quoting steel bars, but the plan was abandoned a few weeks after it was announced because it put automotive consumers at Michigan points other than Detroit at a disadvantage

in freight rates. The new plan corrects this weakness and therefore has a much better chance of being applied successfully. It is believed that it will later be extended to include strip steel, which is shipped to Detroit by water in large quantities.

Application of the new plan means

that companies located so as to ship by water will get a dollar or two a ton more for bars delivered at Detroit and inland mills a dollar or two less. In some quarters the question is being put whether steel mills using water transportation actually have as much advantage as they claim, in view of the extra handling necessary compared with all-rail shipments. Nevertheless, indications are that a greater percentage of steel consumed in the Detroit district will move into consumers' plants by water this year than ever before.

Companies which now are quoting steel bars on the new basis are asking 1.80c., delivered at Detroit, and 1.85c. delivered at outside eastern Michigan points.

Valley Steel Mills Still Hope for Spring Rise Despite Failure of March to Bring Improvement

YOUNGSTOWN, March 21.—Although miscellaneous releases of finished steel products reaching Valley mills have not been sufficient to offset the decline in specifications from the automobile industry thus far in the month, steel company executives have not lost hope for a spring rise in demand. The wire business has already shown some improvement, and demand for reinforcing bars promises to be heavier, judging from the inquiry which is coming out. Outdoor work in general has been set back to some extent by recent cold weather, but is now expected to go forward. A Pittsburgh mill has booked 900 tons of sheet steel piling for the Pymatuning dam near Greenville, Pa.

Demand for pipe, which constitutes one of the chief tonnage outlets in the Valleys, has not yet shown much change. Definite line pipe inquiry is lacking, and oil country goods are still quiet. Sheets and strip, which make up a large percentage of Valley steel output, are adversely affected by low demand from the automobile industry, but production now seems to be adjusted to the minimum requirements of miscellaneous consumers, and no further curtailment in mill operations is expected.

Steel ingot production in the Valleys dropped to nearly 25 per cent last week, and no gain is expected in the current week. However, the leading interest is averaging about 40 per cent in its two plants which are active in the Valleys, and this offsets the low rate of production on the part of the independents. An independent steel works blast furnace has been banked, but the Carnegie Steel Co. has resumed production at one of its Farrell, Pa., stacks. The only active

merchant furnace in the Valleys was blown out on March 19. Another steel company furnace, which has been inactive for several months, will probably resume production in the next few weeks, as its stocks of cold metal have been almost exhausted, and a small purchase was made recently.

Steel prices are theoretically strong, but little buying has occurred to test them. Advancing of quotations has probably deterred forward purchases in some cases, but, with the present determination of steel companies to hold to the new levels, consumers are not likely to benefit by postponement. Contract users are naturally covered for the remainder of the quarter, and some of them have been able to extend their purchases into the second quarter. On current spot orders, however, present quotations are being adhered to. Establishment of a Detroit delivered base on bars will be beneficial to Valley mills which had been seriously handicapped by low-priced water shipments during the summer months. While it is believed that the Detroit base will be extended to strip steel, sheets will not be affected.

Scattered purchases of raw materials are reported, although the small sale of basic pig iron to a steel company, mentioned above, was consummated quietly without general inquiry. This will clean up the stocks of a merchant producer which has been out of blast for some time. One of the large consumers has placed orders for nearly 10,000 tons of scrap, with several grades included. The hydraulic compressed sheets are reported to have brought \$9.50, Pittsburgh, and heavy melting steel commands a premium of 50c. over this figure.

St. Louis Mills Note Increased Specifications for Steel; Jobbing Foundries Have More Inquiries

ST. LOUIS, March 22.—Although this has been another quiet week in the pig iron market, buying being almost negligible, there were some encouraging reports from jobbing foundries in the St. Louis industrial district of better operations in prospect as the result of inquiries for castings. The melt of basic iron continues at low ebb. The recent cold weather stimulated sales of stoves and heaters, reducing stocks, although not causing any increase in plant operations, which are light. Pig iron quotations are unchanged.

Steel

A slight pick-up in specifications for plates, shapes and bars is reported, although most of the orders are small. There has been a slight increase also in inquiries from the oil fields of Kansas, Oklahoma and Texas for plates for repair work. The price structure is reported to be firm, the recent advance being well maintained. Some orders were placed during the week with various factors in the district by automobile manufacturers, but the tonnage was not substantial.

The Granite City Steel Co. reports

that incoming business and shipments for the first half of March were ahead of those of the same period in February. Tin plate business is better than it has been for some time. The volume in sheets is light.

Fabricators of structural steel report that there has been a slight pick-up in orders of less than 100 tons. However, most building projects are being held up pending a proposed readjustment of building trades wages on April 1.

Old Material

Mills in the district have bought very little scrap in the last few weeks, and have given no indication as to when they will reenter the market; however, dealers expect some sort of buying movement before the end of the month. Offerings continue small. A recent sale of steel rails less than 3-ft. at a decline caused dealers to cut their buying price \$1 a ton. Iron car axles are 75c. a ton off, and No. 1 locomotive tires, rails for rolling and No. 1 railroad cast are 50c. a ton lower. Because of the inactivity of the market, prices generally are nominal.

Scrap

The scrap market is unimproved. Prices are weak. Shipments on contracts are at a minimum.

New England Pig Iron Sales About 1000 Tons

BOSTON, March 22.—Pig iron sales range from 10-ton truckloads to small carlots, which in the past week aggregated about 1000 tons. A Worcester, Mass., machinery manufacturer, who inquired for a round tonnage, has postponed purchase indefinitely. A Turners Falls, Mass., foundry is inquiring on 100 tons of No. 2X, delivery up to July 1. Offers of foreign iron at low prices keep domestic iron values unsettled. Close to 3500 tons of Indian iron has been landed in Boston this month. Most of it is basic iron for use by a New England steel plant. Total foreign iron receipts here last year were 5700 tons, against 9250 tons in 1930. Mystic Iron Works shipments the first half of March exceeded those for all of February. The total for March will double that of February.

Reinforcing Bars

Billet bars, in carlots, have been advanced to 2c. a lb., base, minimum. From stock one to 5 ton lots are unchanged at 2.75c. a lb., base, while 6-ton to carlots have been raised from 1.90c. to 2.10c.

Old Material

Business is confined to scattered carlots of bundled skeleton at \$4.50 a ton, delivered Worcester, Mass., or around \$2.50 on cars shipping point, and for Pennsylvania delivery, steel turnings at \$1.25 to \$1.50 a ton, shipping point, mixed borings and turnings at 90c., and No. 1 heavy melting steel at \$4 to \$4.25. A little breakable cast at \$4.25 a ton, shipping point, No. 2 steel at \$3.10, and engine blocks at \$3.25 also have been moved, and one or two cars of textile machinery cast at \$7.50 to \$8 a ton, delivered, and No. 1 machinery cast at \$8 to \$8.50.

Pipe Lines

Northern Natural Gas System. City National Bank Building, Omaha, Neb., plans installation of 4-in. line from David City to Schuyler, Neb., about 14 miles; also distributing system at last noted place; and 8-in. steel pipe line from Schuyler to Columbus, Neb., and vicinity, about 15 miles.

United States Engineer Office. Pittsburgh, specifies use of 12-in., 8-in., and 6-in. steel pipe, as well as smaller sections down to 1½-in. diameter, in connection with construction of Montgomery locks, Ohio River. Bids asked on general contract until April 22 (Circular 565).

Tennessee Gas Co. Union City, Tenn., recently acquired by Arthur K. Lee and associates, is considering expansion and improvements, including pipe line extensions.

Prices of Finished and Semi-Finished Steel

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	<i>Base per Lb.</i>
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.81c. to 1.91c.
Del'd New York	1.85c. to 1.95c.
Del'd Detroit (for second quarter)	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.60c. to 1.70c.
F.o.b. Birmingham	1.70c. to 1.75c.
C.i.f. Pacific ports	2.00c.

Billet Steel Reinforcing

	<i>Base per Lb.</i>
F.o.b. P'gh mills, 40, 50, 60-ft.	1.50c. to 1.60c.
F.o.b. Birmingham, mill lengths	1.75c.
F.o.b. Cleveland	1.50c. to 1.55c.

Rail Steel

	<i>Base per Lb.</i>
F.o.b. mills, east of Chicago dist.	1.30c. to 1.35c.
F.o.b. Chicago Heights mills	1.50c. to 1.60c.
Del'd Philadelphia	1.49c. to 1.55c.

Iron

	<i>Base per Lb.</i>
Common iron, f.o.b. Chicago	1.70c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.11c.
Common iron, del'd New York	2.15c.

Tank Plates

	<i>Base per Lb.</i>
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.70c. to 1.75c.
Del'd Cleveland	1.7035c. to 1.8035c.
Del'd Philadelphia	1.6935c. to 1.7435c.
F.o.b. Coatesville	1.60c. to 1.65c.
F.o.b. Sparrows Point	1.60c. to 1.70c.
F.o.b. Lackawanna	1.60c. to 1.70c.
Del'd New York	1.798c. to 1.898c.
C.i.f. Pacific ports	1.85c.

Structural Shapes

	<i>Base per Lb.</i>
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.70c. to 1.75c.
F.o.b. Lackawanna	1.60c. to 1.70c.
F.o.b. Birmingham	1.70c. to 1.75c.
Del'd New York	1.76775c. to 1.86775c.
C.i.f. Pacific ports (standard)	2.00c.
C.i.f. Pacific ports (wide flange)	2.10c.

Steel Sheet Piling

	<i>Base per Lb.</i>
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. maker's mill)	<i>Base per Lb.</i>
Alloy Quantity Bar Base, 2.65c. per Lb.	
S.A.E. Series	Alloy
2000 ($\frac{1}{2}\%$ Nickel)	\$0.25
2100 ($\frac{1}{2}\%$ Nickel)	0.55
2300 ($\frac{3}{4}\%$ Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot-Rolled

	<i>Base per Lb.</i>
No. 10, f.o.b. Pittsburgh	1.55c.
No. 10, f.o.b. Chicago mill	1.65c.
No. 10, del'd Philadelphia	1.86c.
No. 10, f.o.b. Birmingham	1.70c.
No. 10, c.i.f. Pacific Coast ports	2.30c.

	<i>Base per Lb.</i>
No. 10, Pittsburgh	1.70c.
No. 10, Chicago mills	1.80c.
No. 10, Birmingham	1.85c.

	<i>Base per Lb.</i>
No. 24, f.o.b. Pittsburgh	2.20c.
No. 24, f.o.b. Chicago mills	2.30c.
No. 24, del'd Philadelphia	2.46c. to 2.51c.
No. 24, f.o.b. Birmingham	2.35c. to 2.50c.
No. 24, c.i.f. Pacific Coast ports	2.80c.

	<i>Base per Lb.</i>
No. 10, Pittsburgh	2.25c.
No. 10, gauge, f.o.b. Chicago mills	2.35c.
No. 10, gauge, del'd Philadelphia	2.46c.

	<i>Base per Lb.</i>
No. 20 gauge, f.o.b. Pittsburgh	2.75c.
No. 20 gauge, f.o.b. Chicago mills	2.85c.
No. 20 gauge, del'd Philadelphia	3.06c.

	<i>Base per Lb.</i>
No. 20, f.o.b. Pittsburgh	2.90c.

Heavy Cold-Rolled

	<i>Base per Lb.</i>
No. 10 gauge, f.o.b. Pittsburgh	2.25c.
No. 10 gauge, f.o.b. Chicago mills	2.35c.

	<i>Base per Lb.</i>
No. 10 gauge, del'd Philadelphia	2.46c.

	<i>Base per Lb.</i>
No. 20 gauge, f.o.b. Pittsburgh	2.75c.

	<i>Base per Lb.</i>
No. 20 gauge, f.o.b. Chicago mills	2.85c.

	<i>Base per Lb.</i>
No. 20 gauge, del'd Philadelphia	3.06c.

	<i>Base per Lb.</i>
No. 20, f.o.b. Pittsburgh	2.90c.

Automobile Body Sheets

	<i>Base per Lb.</i>
No. 20, f.o.b. Pittsburgh	2.90c.

Welded Pipe

	<i>Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills</i>
Butt Weld	

<i>Steel</i>	<i>Iron</i>
Inches	Black Galv.
$\frac{3}{8}$	47 21 $\frac{1}{2}$ 1 $\frac{1}{2}$ and $\frac{3}{4}$ +9 +34
$\frac{3}{4}$ to $\frac{5}{8}$	53 27 $\frac{1}{2}$ $\frac{1}{2}$ 25 7
$\frac{5}{8}$	58 44 $\frac{1}{2}$ $\frac{1}{2}$ 30 13
$\frac{5}{8}$	62 50 $\frac{1}{2}$ 1 and $\frac{1}{4}$ 33 17
1 to 3	64 52 $\frac{1}{2}$ 1 $\frac{1}{2}$ and 2 37 20

<i>Lap Weld</i>
2 57 45 $\frac{1}{2}$ 2 25 11
2 $\frac{1}{2}$ to 6 61 49 $\frac{1}{2}$ 2 $\frac{1}{2}$ to 3 $\frac{1}{2}$ 30 15
7 and 8 58 45 $\frac{1}{2}$ 4 to 6 32 19
9 and 10 56 43 $\frac{1}{2}$ 7 and 8 31 18
11 and 12 55 42 $\frac{1}{2}$ 9 to 12 28 13

<i>Butt Weld, extra strong, plain ends</i>
$\frac{3}{8}$ 43 26 $\frac{1}{2}$ $\frac{1}{2}$ and $\frac{3}{4}$ +11 +46
$\frac{3}{8}$ to $\frac{5}{8}$ 49 32 $\frac{1}{2}$ $\frac{1}{2}$ 25 9
$\frac{5}{8}$ 55 44 $\frac{1}{2}$ $\frac{1}{2}$ 30 14
$\frac{5}{8}$ 60 49 $\frac{1}{2}$ 1 to 2 36 20
1 to 1 $\frac{1}{2}$ 62 51 $\frac{1}{2}$ 2 31 15
2 to 3 63 52 $\frac{1}{2}$ 2 31 15

Lap Weld, extra strong, plain ends

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Bolts, Nuts, Coke, Coal, Fuel Oil, Cast Iron Pipe



WIRE PRODUCTS

Carload lots, f.o.b. Pittsburgh and Cleveland after Dec. 31, extras of 10c. a 100 lb. on mixed and joint carloads, 25c. on pool carloads and 40c. less than carloads will be applied on all merchant wire products.)

To Manufacturing Trade

Light wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

	Base per Keg
Standard wire nails	\$1.95
Smooth coated nails	1.95
Galvanized nails	3.95

	Base per Lb.
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.50c.

Galvanized staples	2.75c.
Barbed wire, galvanized	2.60c.
Woven wire fence, No. 9 gage, per net ton	\$55.00
Woven wire fence, No. 12½ gage and lighter, per net ton	60.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	\$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00

Track Equipment

	Base per 100 Lbs.
Spikes, 3/8-in. and larger	\$2.60
Spikes, 1/2-in. and larger	2.60
Spikes, boat and barge	2.80

Tie plate, steel	1.85
Angle bars	2.75
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, per 100 count	75 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine bolts	75
Wing nuts	75
Lag bolts	75
Flange bolts, Nos. 1, 2, 3 and 7 heads	75
Hot pressed nuts, blank or tapped, square	75
Hot pressed nuts, blank or tapped, hexagons	75
Cup and t. square or hex. nuts, blank or tapped	75
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh. Bolts with rolled thread up to and including 5/8 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

Per Cent Off List

Semi-finished hexagon nuts	75
Semi-finished hexagon castellated nuts, S.A.E.	75
Stove bolts in packages, P'gh	85 and 10
Stove bolts in packages, Ch'go	85 and 10
Stove bolts in bulk, P'gh	85, 10 and 23½
Stove bolts in bulk, Chicago	85, 10 and 21½
Stove bolts in bulk, Cleveland	85, 10 and 21½
Tire bolts	60 and 10

Discount of 75 per cent off on bolts and nuts applies on carload business with jobbers and large consumers.

Large Rivets

(1/2-in. and larger)

	Base per 100 Lbs.
F.o.b. Pittsburgh or Cleveland	\$2.25
F.o.b. Chicago	2.35

Small Rivets

(7/8-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread	80, 10 and 10
Upset hex. cap screws, S.A.E. thread	85, 10 and 10
Upset set screws	80, 10 and 5
Milled studs	70

SEMI-FINISHED STEEL

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	\$26.00
Youngstown	26.00
Cleveland	26.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	\$26.00 to \$27.00
Youngstown	26.00 to 27.00
Cleveland	26.00

Skelp

(f.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.50c. to 1.60c.
Universal	1.50c. to 1.60c.
Sheared	1.50c. to 1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	\$37.00
Cleveland	37.00
Chicago	38.00

COKE, COAL AND FUEL OIL

Foundry, Birmingham

5.90

Foundry, by-products, St. Louis

8.00

Foundry, by-products, del'd St. Louis

9.00

Fuel Oil

(Per Gal. f.o.b. Bayonne, N. J.)

No. 3 distillate	3.50c.
No. 4 industrial	3.00c.

(Per Gal. f.o.b. Baltimore)

No. 3 distillate	3.50c.
No. 4 industrial	3.25c.

(Per Gal. f.o.b. Chicago)

No. 3 industrial fuel oil	2.75c.
No. 5 industrial fuel oil	2.60c.

(Per Gal. f.o.b. Cleveland)

No. 3 distillate	4.75c.
No. 4 distillate	4.00c.

Coal

(Per Net Ton)

Mine run steam coal, f.o.b. W. Pa. mines	\$1.40 to \$1.50
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.60
Gas coal, 3/4-in. f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	0.40 to 0.60
Gas slack, f.o.b. W. Pa. mines	0.65 to 0.75

REFRACTORIES

Illinois

38.00 25.00 to 30.00

Ground fire clay

6.50

Chrome Brick

(Per Net Ton)

Standard size	\$42.50
Silica Brick	Per 1000 f.o.b. Works

Pennsylvania

\$38.00

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Pig Iron Prices for All Districts

► VALLEY ◀

Per gross ton, f.o.b. Valley furnace:	
Basic	\$14.50
Bessemer	15.50
Gray forge	15.00
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.50
Low phos., copper free	25.00

Freight rate to Pittsburgh or Cleveland district, \$1.89.

► PITTSBURGH ◀

Per gross ton, f.o.b. Pittsburgh district furnace:	
Basic	\$15.00
No. 2 foundry	16.00
No. 3 foundry	15.50
Malleable	16.00
Bessemer	16.00

Freight rates to points in Pittsburgh district range from 69¢ to \$1.25.

► CHICAGO ◀

Per gross ton at Chicago furnace:	
N'th'n No. 2 fdy.	\$16.50
N'th'n No. 1 fdy.	17.00
Malleable, not over 2.25 sli.	16.50
High phosphorus	16.50
Lake Super. charcoal, sli.	
1.50, by rail	23.17
S'th'n No. 2 fdy.	16.14
Low phos., sli. 1 to 2, copper free	\$28.50 to 29.20
Silvery, sli. 8 per cent.	23.67
Bess. ferrosilicon, 15 per cent	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

► ST. LOUIS ◀

Per gross ton at St. Louis:	
No. 2 fdy., sli. 1.75 to 2.25, f.o.b.	
Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., del'd. St. Louis	18.80
Southern No. 2 fdy., del'd., \$14.50 to 15.50	
Northern malleable, deliv'd.	18.80
Northern basic, deliv'd.	18.80

Freight rates \$3.00 (average) Granite City to St. Louis; \$2.30 from Chicago; \$4.56 from Birmingham.

Prices of Ores, Ferroalloys and Fluorspar

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Per Gross Ton	
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

Per Unit	
Iron, low phos., copper free, 55 to 58%	
iron, dry Spanish or Algerian, 8c. to 8.50c.	
Iron, low phos., Swedish, aver. 68% iron, 9.00c.	
Iron, basic or foundry, Swedish, average	
65% iron	8.00c.
Iron, basic and foundry, Russian, aver.	
63% iron (nom.)	9.00c.
Manganese, Caucasian, washed 52% to 24.00c.	
Manganese, African, Indian, 50-52%, 23c. to 24c.	
Manganese, Brazilian, 46 to 48%, 21c. to 22c.	

Per Gross Ton	
Tungsten, Chinese wolframite	\$10.75 to \$11.00
Tungsten, domestic scheelite	10.00 to 10.50
Chrome, 45% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	\$18.00
Chrome, 48% Cr ₂ O ₃ , c.i.f. Atlantic seaboard	20.00

Ferromanganese

Per Gross Ton	
Domestic, 80%, seaboard	*\$72.00 to \$75.00
Foreign, 80%, Atlantic or Gulf port, duty paid	*72.00 to 75.00

*Minimum price quoted for lots of 2000 tons or more.

► NEW YORK ◀

Per gross ton, delivered New York district:

*Buffalo, No. 2, del'd east.	
N. J.	\$17.91 to \$18.41
East. Pa. No. 2 fdy.	17.02 to 17.52
East. Pa. No. 2X fdy.	17.52 to 18.02

Freight rates: \$1.52 to \$2.63 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.41 a ton from Buffalo.

► BUFFALO ◀

Per gross ton, f.o.b. furnace:

No. 2 fdy.	\$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sli. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal, del'd.	23.41

► NEW ENGLAND ◀

Per gross ton delivered to most New England points:

*Buffalo, sli. 1.75 to 2.25	\$19.54 to \$20.04
*Buffalo, sli. 2.25 to 2.75	19.54 to 20.04
*Ala., sli. 1.75 to 2.25	19.74
*Ala., sli. 2.25 to 2.75	20.24
*Ala., sli. 1.75 to 2.25	15.88
*Ala., sli. 2.25 to 2.75	16.28

Freight rates: \$5.04 all rail from Buffalo; \$9.75 all rail from Alabama and \$5.88 rail and water from Alabama to New England seaboard.

*All rail rate.

*Rail and water rate.

► CINCINNATI ◀

Per gross ton, delivered Cincinnati:

Ala., fdy., sli. 1.75 to 2.25	\$13.82
Ala., fdy., sli. 2.25 to 2.75	14.32
Tenn., fdy., sli. 1.75 to 2.25	13.82
N'th'n No. 2 foundry	\$17.01 to 17.59
S'th'n Ohio silvery, 8 per cent.	22.02

Freight rates, \$2.02 from Ironton and Jackson, Ohio; \$3.82 from Birmingham.

► PHILADELPHIA ◀

Per gross ton at Philadelphia:

East. Pa. No. 2	\$15.59 to \$16.00
East. Pa. No. 2X	16.09 to 16.50
East. Pa. No. 1X	16.59 to 17.00
Basic (del'd east. Pa.)	16.00
Malleable	18.00 to 18.50
Stand. low phos. (f.o.b. east. Pa. furnace)	22.00 to 23.00
Cop. b'rg low phos. (f.o.b. furnace)	22.00 to 22.50
Va. No. 2 plain	22.04
Va. No. 2X	22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates 8¢c. to \$1.79 from eastern Pennsylvania furnaces; \$4.67 from Virginia furnaces.

► CLEVELAND ◀

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	\$15.50
S'th'n fdy., sli. 1.75 to 2.25	16.14
Malleable (local delivery)	15.50
Ohio silvery, 8 per cent.	21.82
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 55¢. average local switching charge; \$3.12 from Jackson, Ohio; \$6.14 from Birmingham.

► BIRMINGHAM ◀

Per gross ton, f.o.b. Birmingham dist. furnaces:	
No. 2 fdy., 1.75 to 2.25 sli.	\$11.00
No. 2 soft, 2.25 to 2.75 sli.	11.50
Basic	11.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 55¢. average local switching charge; \$3.12 from Jackson, Ohio; \$6.14 from Birmingham.

► CANADA ◀

Per gross ton:

Delivered Toronto	
No. 1 fdy., sli. 2.25 to 2.75	\$22.60
No. 2 fdy., sli. 1.75 to 2.25	22.10
Malleable	22.60

Delivered Montreal	
No. 1 fdy., sli. 2.25 to 2.75	\$24.00
No. 2 fdy., sli. 1.75 to 2.25	23.50
Malleable	24.00
Basic	\$23.00 to 23.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads, \$1.08. Ferrotungsten, less carloads, \$1.15 to 1.25. Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr, per lb. contained Cr, delivered, in carloads, \$10.00c. Ferrochromium, 2% carbon, 17.00c. to 17.50c. Ferrochromium, 1% carbon, 19.00c. to 20.00c. Ferrochromium, 0.10% carbon, 23.50c. to 25.00c. Ferrochromium, 0.06% carbon, 25.50c. to 27.00c. Ferrovandomium, del., per lb. contained Va., \$3.00 to \$3.30. Ferrocobaltitium, 15 to 18%, per net ton, f.o.b. furnace, in carloads, \$16.00. Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton, 91.00. Ferromolybdenum, per lb. Mo. del., 95c. Calcium molybdate, per lb. Mo. del., 80c. Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton, \$113.50. Silico spiegel, per ton, f.o.b. furnace, car lots, 42.50. Ton lots or less, per ton, 47.50. Silico-manganese, gross ton, delivered: 2.50% carbon grade, 105.00. 1% carbon grade, 11

Old Material Quotations

► PITTSBURGH ◄

Per gross ton delivered consumers' yards:		
No. 1 heavy melting steel.	\$10.00 to \$10.50	
No. 2 heavy melting steel.	8.75 to 9.25	
No. 2 railroad wrought.	10.00 to 10.50	
Scrap rails.	10.00 to 10.50	
1/4 in. 3 ft. and under.	12.00 to 12.50	
Sheet bar crops, ordinary.	10.00 to 10.50	
Compressed sheet steel.	9.75 to 10.25	
Lead bundled sheet steel.	8.50 to 9.00	
Hvy. steel axle turnings.	9.00 to 9.50	
Machine shop turnings.	6.75 to 7.25	
Short shov. steel turnings.	6.75 to 7.25	
Short mixed borings and turnings.	6.75 to 7.25	
Cast iron borings.	6.75 to 7.25	
Cast iron carwheels.	9.75 to 10.25	
Heavy breakable cast.	8.00 to 8.50	
No. 1 cast.	9.00 to 10.00	
Railr. knuckles and couplers.	10.50 to 11.00	
Ball, coil and leaf springs.	10.50 to 11.00	
Rolled steel wheels.	10.50 to 11.00	
Low phos. billet crops.	13.00 to 13.50	
Low phos. sheet bar crops.	12.50 to 13.00	
Low phos. plate scrap.	11.00 to 11.50	
Low phos. punchings.	11.00 to 11.50	
Steel car axles.	15.00 to 15.50	

► CLEVELAND ◄

Per gross ton delivered consumers' yards:		
No. 1 heavy melting steel.	\$7.25 to \$7.75	
No. 2 heavy melting steel.	6.50 to 7.00	
Compressed sheet steel.	7.00 to 7.25	
Light bundled sheet stampings.	6.00 to 6.50	
Drop forge flashings.	6.00 to 6.25	
Machine-shop turnings.	4.00 to 4.25	
Short shoveling turnings.	5.75 to 6.25	
No. 1 busheling.	6.50 to 6.75	
Steel axle turnings.	7.50 to 8.00	
Low phos. billet crops.	14.00 to 14.50	
Cast iron borings.	5.75 to 6.00	
Mixed borings and short turnings.	5.75 to 6.00	
No. 2 busheling.	5.75 to 6.00	
No. 1 cast.	9.00 to 9.50	
Railroad grate bars.	6.00 to 6.50	
Stove plate.	6.00 to 6.50	
Rails under 3 ft.	12.00 to 12.50	
Rails for rolling.	11.00 to 12.00	
Railroad malleable.	9.50 to 10.00	

► BUFFALO ◄

Per gross ton, f.o.b. Buffalo consumers' plants:		
No. 1 heavy melting steel.	\$7.50	
No. 2 heavy melting scrap.	6.00 to \$6.50	
Scrap rails.	8.00 to 8.50	
New hydraul. comp. sheets.	6.00 to 6.50	
Old hydraul. comp. sheets.	5.00 to 5.50	
Drop forge flashings.	6.00 to 6.50	
No. 1 busheling.	6.00 to 6.50	
Hvy. steel axle turnings.	7.00	
Machine shop turnings.	5.00	
Knuckles and couplers.	10.00	
Coupled and leaf springs.	10.00	
Rolled steel wheels.	10.00	
Low phos. billet crops.	12.00 to 12.50	
Short shov. steel turnings.	6.50 to 7.00	
Short mixed borings and turnings.	6.00 to 6.50	
Cast iron borings.	6.00 to 6.50	
No. 2 busheling.	3.50 to 4.00	
Steel car axles.	10.00 to 11.00	
Iron axles.	12.00 to 12.50	
No. 1 machinery cast.	9.25 to 9.75	
No. 1 cupola cast.	8.75 to 9.00	
Stove plate.	8.25 to 8.75	
Steel rails, 3 ft. and under.	11.00 to 11.50	
Cast iron carwheels.	9.00 to 9.50	
Industrial malleable.	9.00 to 9.50	
Railroad malleable.	9.00 to 9.50	
Chemical borings.	8.50 to 9.00	

► BIRMINGHAM ◄

Per gross ton delivered consumers' yards:		
Heavy melting steel.	\$7.50 to \$8.00	
Scrap steel rails.	8.00 to 8.50	
Short shoveling turnings.	3.50 to 4.00	
Stove plate.	6.00	
Steel axles.	12.00	
Iron axles.	12.00 to 12.50	
No. 1 machinery cast.	9.25 to 9.75	
No. 1 cupola cast.	8.75 to 9.00	
Stove plate.	8.25 to 8.75	
Steel rails, 3 ft. and under.	11.00 to 11.50	
Cast iron carwheels.	9.00 to 9.50	
Industrial malleable.	9.00 to 9.50	
Railroad malleable.	9.00 to 9.50	
Chemical borings.	8.50 to 9.00	

► ST. LOUIS ◄

Dealers' buying prices per gross ton:		
Selected heavy steel.	\$7.00 to \$7.50	
No. 1 heavy melting.	6.25 to 6.75	
No. 2 heavy melting.	5.75 to 6.25	
No. 1 locomotive tires.	6.00 to 6.50	
Misc. stand-sec. rails.	7.50 to 7.75	
Railroad springs.	8.50 to 9.00	
Bundled sheets.	4.25 to 4.75	
No. 2 railroad wrought.	6.25 to 6.75	
No. 1 busheling.	5.50 to 6.00	
Cast iron borings and shoveling turnings.	4.75 to 5.25	
Iron rails.	7.00 to 8.00	
Rails for rolling.	8.50 to 9.00	
Machine shop turnings.	3.00 to 3.50	
Heavy turnings.	5.00 to 5.50	
Steel car axles.	9.50 to 10.00	
Iron car axles.	12.50 to 13.00	
Wrot. iron bars and trans.	5.00 to 5.50	
No. 1 railroad wrought.	4.75 to 5.25	
Steel rails, less than 3 ft.	8.50 to 9.00	
Steel angle bars.	6.50 to 7.00	
Cast iron carwheels.	6.00 to 6.50	
No. 1 machinery cast.	8.00 to 8.50	
Railroad malleable.	5.00 to 5.50	
No. 1 railroad cast.	5.75 to 6.25	
Stove plate.	6.00 to 6.50	
Relay. rails, 60 lb. and under.	16.00 to 16.50	
Relay. rails, 70 lb. and over.	20.00 to 21.00	
Agricult. malleable.	5.00 to 5.50	

► NEW YORK ◄

Dealers' buying prices per gross ton:		
No. 1 heavy melting steel.	\$4.25 to \$5.50	
No. 2 heavy melting steel.	3.75 to 4.50	
Heavy melting steel (yard).	2.75 to 3.00	
No. 1 hvy. breakable cast.	5.00 to 5.50	
Stove plate (steel works).	3.00 to 3.50	
Machine shop turnings.	1.00 to 1.50	
Short shoveling turnings.	1.00 to 1.50	
Cast borings.	1.00 to 1.50	
No. 1 blast furnace.	1.00 to 1.50	
Steel car axles.	10.00 to 10.50	
Iron car axles (nom.).	14.00 to 14.50	
Spec. iron and steel pipe.	3.00 to 3.50	
Forge fire.	3.25	
No. 1 railroad wrought.	5.00 to 5.25	
No. 1 yard wrought, long.	4.00 to 4.25	
Rails for rolling.	6.00 to 6.25	
No. 1 cast.	5.75 to 6.00	
No. 2 cast.	5.00 to 5.50	
Stove plate (foundry).	4.75 to 5.25	
Malleable cast (railroad).	6.00 to 6.50	
Cast borings (chemical).	8.00 to 8.50	

Per gross ton, delivered local foundries:

No. 1 machinery cast.	\$8.50
No. 1 hvy. cast (cupola size).	7.50
No. 2 cast.	6.50

► BOSTON ◄

Dealers' buying prices per gross ton:		
No. 1 heavy melting steel.	\$4.00 to \$4.25	
Scrap T rails.	3.80 to 4.60	
Machine shop turnings.	1.25 to 1.50	
Cast iron borings.	1.05	
Bundled skeleton, long.	2.50	
Forge flashings.	3.00 to 3.50	
Blast furnace scrap.	0.90 to 1.00	
Forge scrap.	3.00 to 3.25	
Shafting.	9.50 to 10.00	
Steel car axles.	9.00 to 9.50	
Wrought pipe.	4.00 to 4.25	
Rails for rolling.	6.00 to 6.50	
Cast iron borings, chemical.	7.00 to 7.25	

Per gross ton delivered consumers' yards:

Textile cast.	\$7.50 to \$8.00
No. 1 machinery cast.	8.00 to 8.50
Stove plate.	5.00 to 5.25
Railroad malleable.	10.50 to 11.00

► CINCINNATI ◄

Dealers' buying prices per gross ton:		
Heavy melting steel.	\$6.00 to \$7.00	
Scrap rails for melting.	8.00 to 8.50	
Loose sheet clippings.	2.00 to 2.50	
Bundled sheets.	4.75 to 5.25	
Cast iron borings.	2.75 to 3.25	
Machine shop turnings.	3.25 to 3.75	
No. 1 busheling.	4.25 to 4.75	
No. 2 busheling.	2.50 to 3.00	
Rails for rolling.	9.00 to 9.50	
No. 1 locomotive tires.	8.50 to 9.00	
Short rails.	11.75 to 12.25	
Cast iron carwheels.	8.25 to 8.75	
No. 1 machinery cast.	10.00 to 10.50	
No. 1 railroad cast.	8.75 to 9.25	
Burnt cast.	4.25 to 4.75	
Stove plate.	4.25 to 4.75	
Agricultural malleable.	8.00 to 8.50	
Railroad malleable.	9.00 to 9.50	

► DETROIT ◄

Dealers' buying prices per gross ton:		
Hvy. melting.	\$5.75 to \$6.25	
Borings and short turnings.	4.00 to 4.50	
Long turnings.	3.25 to 3.75	
No. 1 machinery cast.	8.50 to 9.00	
Automotive cast.	10.75 to 11.25	
Hydraul. comp. sheets.	5.75 to 6.25	
Stove plate.	4.50 to 5.00	
New No. 1 busheling.	4.75 to 5.25	
Old No. 2 busheling.	3.00 to 3.50	
Sheet clippings.	3.25 to 3.75	
Flashings.	4.75 to 5.25	

► CANADA ◄

Dealers' buying prices per gross ton:		

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Warehouse Prices for Iron and Steel Products

▶ CHICAGO ◀

	Base per Lb.
Plates and struc. shapes.....	3.00c.
Soft steel bars.....	2.75c.
Reinforcing bars, billet steel.....	1.75c.
Rail steel reinforcement.....	1.55c. to 1.65c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.10c.
Flats and squares.....	3.60c.
Bands, $\frac{1}{8}$ in. (in Nos. 10 and 12 gages).....	2.95c.
Hoops (No. 14 gage and lighter).....	3.50c.
Hot-rolled annealed sheets (No. 24).....	3.55c.
Galv. sheets (No. 24).....	4.10c.
Hot-rolled sheets (No. 10).....	3.20c.
Spikes ($\frac{1}{4}$ in. and lighter).....	3.45c.
Track bolts.....	4.30c.
Rivets, structural.....	3.75c.
Rivets, boiler.....	3.75c.
Per Cent Off List	
Machine bolts.....	73
Carriage bolts.....	73
Coach and lag screws.....	73
Hot-pressed nuts, sq., tap, or blank.....	73
Hot-pressed nuts, hex., tap, or blank.....	73
No. 8 black ann'l'd wire, per 100 lb.	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c't'd nails, base per keg.....	2.30

▶ CLEVELAND ◀

	Base per Lb.
Plates and struc. shapes.....	2.95c.
Soft steel bars.....	2.75c.
Reinfor. steel bars.....	1.75c. to 1.95c.
Cold-fin. rounds and hex.....	3.10c.
Cold-fin. flats and sq.....	3.60c.
Hoops and bands, No. 12 to $\frac{1}{8}$ in., inclusive.....	3.00c.
Hoops and bands, No. 13 and lighter.....	3.55c.
Cold-finished strip.....	5.55c.
Hot-rolled annealed sheets (No. 24).....	3.25c.
Galvanized sheets (No. 24).....	3.75c.
Hot-rolled sheets (No. 10).....	3.00c.
Black ann'l'd wire, per 100 lb.	\$2.75
No. 9 galv. wire, per 100 lb.	3.20
Com. wire nails, base per keg.....	2.35

*Net base, including boxing and cutting to length.

▶ CINCINNATI ◀

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
New billet reinfor. bars.....	3.00c.
Rail steel reinfor. bars.....	3.00c.
Hoops	3.90c.
Bands	3.20c.
Cold-fin. rounds and hex.....	3.50c.
Squares	4.00c.
Hot-rolled annealed sheets (No. 24).....	3.75c.
Galv. sheets (No. 24).....	4.25c.
Hot rolled sheets (No. 10).....	3.30c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	\$3.00
Com. wire nails, base per keg (10 to 49 kegs).....	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Seamless steel boiler tubes, 2-in.	\$17.50
4-in.	36.00
Lap-welded steel boiler tubes, 2-in.	16.50
4-in.	34.50

▶ BUFFALO ◀

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Soft steel bars.....	3.00c.
Reinforcing bars.....	2.65c.
Cold-fin. flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.25c.
Hot-rolled annealed sheets (No. 24).....	3.70c.
Galv. sheets (No. 24).....	4.10c.
Bands	3.35c.
Hoops	3.90c.
Hot-rolled sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$2.45
Black wire, base per 100 lb.....	3.20

▶ NEW YORK ◀

	Base per Lb.
Plates and struc. shapes.....	2.70c. to 3.10c.
Soft steel bars, small shapes.....	2.70c. to 3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal.....	6.00c. to 6.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Hot-rolled sheets (No. 10).....	3.00c. to 3.25c.
Hot-rolled ann'l'd sheets (No. 24*)	3.60c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel, $\frac{1}{2}$ in. $\times \frac{1}{2}$ in. and larger	3.40c.
Smooth finish, 1 to $2\frac{1}{2}$ $\times \frac{1}{4}$ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.
Common wire nails, base, per keg	\$2.60
Per Cent Off List	
Machine bolts, cut thread: Off List	
$\frac{3}{4}$ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
$\frac{1}{2}$ x 6 in. and smaller	65 to 65 and 10
$\frac{3}{4}$ x 20 in. and smaller	65 to 65 and 10
Boiler Tubes: Per 100 Ft.	
Lap welded, 2-in.	\$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00
*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.	

▶ ST. LOUIS ◀

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
Cold-fin. rounds, shafting, screw stock	3.35c.
Hot-rolled annealed sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Hot-rolled sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	3.85c.
Galv. corrug. sheets	4.40c.
Structural rivets	4.00c.
Boiler rivets	4.00c.
Per Cent Off List	
Tank rivets, $\frac{1}{2}$ -in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	73
Carriage bolts	73
Lag screws	73
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	73
Less than 200 lb.	63
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	73
Less than 200 lb.	63

▶ PACIFIC COAST ◀

	Base per Lb.—
San Fran. Los Angeles Seattle	
Plates and struc. shapes, $\frac{1}{4}$ -in. and heavier	3.15c. 3.15c. 2.75c.
Soft steel bars	3.15c. 3.15c. 2.75c.
Reinforcing bars	2.80c. 2.80c. 3.00c.
Hot-rolled annealed sheets (No. 24)	3.95c. 4.05c. 4.25c.
Hot-rolled sheets (No. 10)	3.50c. 3.50c. 3.75c.
Galv. sheets (No. 24)	4.55c. 4.35c. 4.75c.
Struct. rivets, $\frac{1}{2}$ in. and larger, less than 1000 lb.	5.00c. 5.00c. 4.00c.
Cold-finished steel bars and shaftings:	
Rounds	5.25c. 5.15c. 4.50c.
Squares	6.25c. 6.15c. 5.75c.
Hexagons	6.25c. 6.15c. 5.75c.
Flats	6.75c. 6.15c. 6.75c.
Common wire nails, base per kg in less carloads	\$2.75 \$2.75 \$2.75
Plates, shapes, bars, bands and hot-rolled sheets, No. 16 gage and heavier, subject to group differentials	
Cold-finished steel bars and shafting, subject to warehouse differentials for quantity	
All prices f.o.b. warehouse.	

▶ PITTSBURGH ◀

	*Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	3.10c.
Squares and flats	3.60c.
Bands	2.95c.
Hoops	3.60c.
Hot-rolled annealed sheets (No. 24), 24, 25 or more bundles	3.15c.
Galv. sheets (No. 24), 25 or more bundles	3.65c.
Hot-rolled sheets (No. 10)	3.10c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	\$3.74
Spikes, large	2.50c.
Small	2.75c. to 2.90c.
Boat	3.00c.
Track bolts, all sizes, per 100 count, 70 and 10 per cent off list	
Machine bolts, 100 count, 70 and 10 per cent off list	
Carriage bolts, 100 count, 70 and 10 per cent off list	
Nuts, all styles, 100 count, 73 and 10 per cent off list	
Large rivets, base per 100 lb.	\$3.00
Wire, black, soft ann'l'd, base per 100 lb.	2.75
Wire, galv. soft, base per 100 lb.	3.20
Common wire nails, per keg	2.35
Cement coated nails, per keg	2.35

*On plates, structural, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

▶ PHILADELPHIA ◀

	Base per Lb.
Plates, $\frac{1}{4}$ -in. and heavier	2.45c.
Structural shapes	2.45c.
Soft steel bars, small shapes, iron bars (except bands)	2.45c.
Reinfor. steel bars, sq., twisted and deform	2.30c.
Cold-fin. steel, rounds and hex	3.30c.
Cold-fin. steel, sq. and flats	3.80c.
Steel hoops	3.00c.
Steel bands, No. 12 to $\frac{1}{8}$ in., inclu	2.75c.
Spring steel	5.00c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galvanized sheets (No. 24)	3.50c.
Hot-rolled and annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, $\frac{1}{4}$ in	5.00c.
Swedish iron bars	6.00c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

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Copper Steady on Curtailment Program; Prompt Tin Is Becoming Scarce

NEW YORK, March 22.—Indications that the recent agreement to curtail copper production will soon become operative are borne out by an announcement today by Belgian producers to the effect that they have agreed to plans for restricting their output on the basis of actual consumption in the last three months. Based upon the impending improvement in the industry's statistical position, the domestic market continues to reflect firm tendencies. In spite of an almost total lack of domestic demand, the price of electrolytic copper is steady and unchanged at 6c. a lb., delivered Connecticut Valley. A few distress lots have been sold at 5.50c. to 5.87½c., but leading producers are not disposed to meet these concessions.

The official quotation of Copper Exporters, Inc., is still 6.62½c. a lb., f.i.f. usual European ports. Sales are being transacted, however, at the special price of 6.12½c. The special quotation has tended to maintain a fairly steady flow of orders from abroad, export bookings thus far in

March amounting to about 16,000 tons. Lake copper is extremely quiet, and the price is nominal at 6.12½c., delivered.

Lead

The recent reduction in prices has failed thus far to stimulate consumer interest. Buying is confined almost entirely to small lots for spot shipment. Prices are somewhat easier, although the leading producers continue to quote 3.15c., New York, and 3c., St. Louis.

Tin

Buying for nearby delivery continues in fair volume, while some business is being placed for May and June delivery. Spot tin is becoming rather scarce, with the result that two of the leading importers are out of the market for prompt commitments. The domestic market is maintaining a steady tone, with today's price 21.75c. The London price of tin has declined sharply in sympathy with the downward movement in sterling exchange. Today's London market is

£127 15s. a ton for spot standard, £129 10s. for future standard and £131 for spot Straits. The Singapore market today is £133 7s. 6d. Straits shipments in March have been disappointingly small, with the total up to and including March 19 amounting to only 2617 tons. Warehouse stocks in the United Kingdom now stand at 33,470 tons, a decrease of 28 tons from the preceding week. A 195-ton shipment of English refined tin, the first consignment of its kind to be shipped since last October, was forwarded from abroad last week.

Zinc

A somewhat better demand appeared today, but interest still reflects hesitancy on the part of buyers to cover beyond their actual requirements. Sales in the past week amounted to only about 1600 tons. As a result of the recent lack of buying, prices have shown a downward tendency, with current quotations of 3.14½c., New York, and 2.77½c., East St. Louis, being named by leading producers.

Antimony

Activity in this market is at a standstill. Prompt metal is nominal at 6.12½c., f.o.b. New York, and futures are quotable at about 3.80c., c.i.f. New York.

Cast Iron Pipe

Brentwood, N. Y., awarded 285 tons of 3 to 36-in. to United States Pipe & Foundry Co.

Mount Vernon, N. Y., has rejected all bids on 400 tons of 12-in., on which Warren Foundry & Pipe Corp. was low bidder; new bids to be taken March 24.

Bethlehem, Pa., is inquiring for 350 tons of 6, 8 and 12-in.

Harrisburg, Pa., is taking bids until March 29 on 500 tons of 6, 8 and 12.

Portsmouth, Ohio, opened bids on 125 tons of 6 and 8-in.; American Cast Iron Pipe Co. is low bidder.

Marquette, Mich., awarded 2000 ft. of 12 and 16-in. Class D to James B. Clow & Sons.

Wilmette, Ill., will require 300 tons for filtration plant.

Vernal, Utah, plans installation of pipe line for water supply from Uinta Basin, to cost about \$50,000.

Detroit Scrap Unchanged

DETROIT, March 22.—The local scrap market remains dull, with sales to consumers at a standstill. Prices are unchanged.

E. F. Houghton & Co., 240 West Somerset Street, Philadelphia, in a book published by the company's research staff describes a new core oil produced from a mineral oil base. Advantages claimed for the new product include lower cleaning costs and fewer blow-hole losses.

The Week's Prices. Cost Per Pound for Early Delivery

	Mar. 16	Mar. 17	Mar. 18	Mar. 19	Mar. 21	Mar. 22
Lake copper, New York.....	6.12½c.	6.12½c.	6.12½c.	6.12½c.	6.12½c.	6.12½c.
Electrolytic copper, N. Y.	5.75	5.75	5.75	5.75	5.75	5.75
Straits tin, spot, N. Y.	21.70	21.70	21.90	21.70	21.70	21.75
Lead, East St. Louis.....	2.80	2.80	2.80	2.77½c.	2.77½c.	2.77½c.
Lead, New York.....	3.17	3.17	3.17	3.14½c.	3.14½c.	3.14½c.
Lead, St. Louis.....	3.00	3.00	3.00	3.00	3.00	3.00
Lead, New York.....	3.15	3.15	3.15	3.15	3.15	3.15

*Refinery quotation: price ¼c. higher delivered in the Connecticut Valley.
Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.12½c. a lb., New York.
Brass Ingots, 85-5-5-5, 6.25c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig.....	24.00c. to 25.00c.
Tin, bar.....	26.00c. to 28.00c.
Copper, Lake.....	8.00c. to 9.00c.
Copper, electrolytic....	7.75c. to 8.75c.
Copper, casting.....	7.50c. to 8.50c.
*Copper sheets, hot-rolled	15.37½c.
*High brass sheets....	12.50c.
*Seamless brass tubes.....	15.75c.
*Seamless copper tubes.....	14.87½c.
*Brass rods.....	10.25c.
*Brazed brass tubes....	21.62½c.
Brass slab.....	4.00c. to 4.50c.
Copper sheets (No. 9), cans.....	9.25c. to 9.50c.
Lead, American pig.....	4.00c. to 4.50c.
Lead, bar.....	5.75c. to 6.75c.
Lead sheets.....	7.75c.
Antimony, Asiatic.....	9.00c. to 10.00c.
Alum, virgin, 99 per cent plus.....	23.30c.
Alum, No. 1 for remelt-ing, 98 to 99 per cent.....	17.00c. to 18.00c.
Solder, ½ and ¾.....	15.00c. to 16.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig.....	26.25c.
Tin, bar.....	28.25c.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	4.50c.	5.25c.
Copper, hvy. and wire	4.25c.	5.00c.
Copper, light and bot-	3.50c.	4.25c.
toms	2.25c.	2.75c.
Brass, heavy.....	1.75c.	2.50c.
Brass, light.....	3.50c.	4.00c.
Hvy. machine com-	2.50c.	3.00c.
No. 1 yel. brass	3.00c.	3.50c.
turnings	2.50c.	3.00c.
No. 1 red brass or	3.00c.	3.50c.
compos. turnings	2.25c.	2.75c.
Lead, heavy	1.00c.	1.375c.
Zinc	3.50c.	5.00c.
Cast aluminum.....	8.50c.	10.50c.
Sheet aluminum.....	8.50c.	10.50c.

Fabricated Structural Steel

Awards of 10,300 Tons Include 2700 Tons for Electrification
Work—New Projects of 4300 Tons

LETINGS of fabricated structural steel total 10,300 tons, compared with 15,750 tons a week ago. The bulk of this business was in the East and includes 2700 tons for electrification of the Norristown branch of the Reading Railroad and 1640 tons for highway bridges at Vandergrift and New Castle, Pa. New jobs call for only 4300 tons, the largest, 1100 tons, is for a building for the General Electric Co. A post office in Texarkana, Ark., will require 1000 tons. Awards follow:

NORTH ATLANTIC STATES

Cambridge, Mass., 600 tons, Rindge technical school, to New England Structural Co.
York, Me., 150 tons, State bridge, to New England Structural Co.
Boston, 120 tons, State bridge at West Roxbury, to Albany Bridge Co.
Chelsea, Mass., 300 tons, nurses' home and service building, Soldiers' Home, to Lackawanna Steel Construction Corp.
Aurora, N. Y., 160 tons, Wells College administration building, to Syracuse Engineering Co.
Albany, N. Y., 720 tons, Albany Port Commission, to Lackawanna Steel Construction Corp.
New York, 160 tons, Queensboro Dairy Products Co., to J. Klein Iron Works.

State of Pennsylvania, 1640 tons, highway bridges at Vandergrift and New Castle, to McClintic-Marshall Corp.
Philadelphia, 2700 tons, Reading Railroad electrification of Norristown branch, to McClintic-Marshall Corp.
Philadelphia, 600 tons, Episcopal hospital, to Ingalls Iron Works.
Norristown, Pa., 275 tons, State hospital, to Frank M. Weaver & Co., Philadelphia.
Jamestown, N. Y., 300 tons, sheet steel piling for Fymatuning Dam, to Carnegie Steel Co.
Cumberland, Md., 325 tons, bridge for Baltimore & Ohio Railroad, to Mount Vernon Bridge Co.

SOUTH AND SOUTHWEST

Charleston, S. C., 180 tons, school for Presbyterian Church, to Pittsburgh Bridge & Iron Co.
State of Texas, 150 tons, San Antonio Creek bridge, to Pacific Coast Engineering Co.
Houston, Tex., 100 tons, Weingarten store, to Houston Structural Steel Co.
State of Oklahoma, 549 tons, highway bridges; Cotton County, 250 tons; Johnston County, 188 tons; Marshall County, 111 tons, to J. B. Klein Iron & Foundry Co.
Mill Creek, Okla., 100 tons, highway bridge, to Virginia Bridge & Iron Co.

CENTRAL STATES

Wickliffe, Ohio, 100 tons, addition to high school, to Republic Structural Iron Works.
Joliet, Ill., 250 tons, stone crusher plant, to Continental Bridge Co.
State of Illinois, 200 tons, highway beam spans, to International Steel & Iron Co., Evansville, Ind.

WESTERN STATES

McCook County, Nev., 300 tons, highway beam spans, to St. Joseph Structural Steel Co.
Los Angeles, 140 tons, San Antonio Creek bridge, to Pacific Coast Engineering Co.
San Francisco, 250 tons, battery building at Mare Island Navy Yard, to Judson-Pacific Co.
Seal Beach, Cal., 288 tons, piling for generating plant, to Pacific Coast Steel Co.
Portland, Ore., 200 tons additional for Federal building, to Poole & McGonigle.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Boston, 500 tons, Latin school.

NEW REINFORCING BAR PROJECTS

Troy-Menands, N. Y., 500 tons, bridge; to be opened March 30.
Newark, N. J., 100 tons, sewer projects.
Detroit, 600 tons, post office; Great Lakes Construction Co., general contractor.
Waukesha, Wis., 400 tons, quarry grade separation; Eau Claire Engineering Co., Eau Claire, Wis., low bidder.
Roseburg, Ore., 600 tons, Veterans Hospital; bids closed March 22.

Republic Mill at Buffalo Rolling Axles for Ford

BUFFALO, March 22.—Sales and shipments of pig iron are very spotty. Only carload lots are being moved. No sizable inquiries are out. Operations of furnaces remain the same.

Steel

The Lackawanna plant of Bethlehem Steel has increased its open-hearth operation to seven, this rate to continue the remainder of the month. Republic Steel started four open-hearts last Thursday with the prospect that they would continue in operation all this week. Wickwire Spencer has temporarily increased from one open-hearth to two. The Seneca Iron & Steel Co. is operating at 25 to 30 per cent. Republic Steel has received an order from the Ford Motor Co. for 20,000 die-rolled axles for immediate delivery, with 20,000 additional to be released soon. It is stated that the Houde Engineering Corp., Buffalo, a division of the Houdaille-Hershey Corp., last week received the first orders for shock absorbers for the new Ford. This plant supplied the shock absorbers for the present four-cylinder model. No sheet orders have been received from Detroit.

A Buffalo fabricator of structural steel has received an order for 500 tons from the Albany Port Commission for dock towers and conveyors. This concern will also fabricate 300 tons of steel for a nurses' home and service building at the Soldiers' Home, Chelsea, Mass.

Old Material

Business is almost at a standstill. Mill suspensions continue except for shipments of borings and turnings and stove plate. Stove plate and No. 1 machinery cast are scarce. One dealer shipping No. 2 heavy melting steel to Pittsburgh is understood to have accepted \$5.40. A mill which had been taking in No. 2 steel has now suspended shipments until May 1. All prices are nominal in the absence of new business.

Toledo Machine Co., Toledo, Ohio, has applied to the Tariff Commission for an increase in the duty of 40 per cent on power-driven machines for punching, shearing, etc.

Will Try for Iron Ore Royalty Reductions

(Concluded from page 737)

53c. a ton. What the royalty might be under actual competitive conditions and if the State had anything worth while to offer, is uncertain. The time is sure to come when this question will be answered, for the State will in a few years be offering residue tonnages in mines now under lease.

Owing to the preponderance of leases at 25 to 30c. a ton, the average royalty on ore mined in Minnesota is approximately 42c., and more than 99 per cent of all ore produced in the State is from leases. This is not far from the ratio for the Gogebic range, but on the Menominee and Marquette a large share of ore is mined from fee lands, and carries no royalty.

Taxation High in a Lean Year

Ore taxation in all these States is on the ad valorem basis, and in Minnesota taxable valuation is set at 50 per cent of true and full value. The larger tonnage disclosed in a mine, the higher its tax payments, whatever may be its year's production. The miner must absorb his taxes every year, as he does his other costs, and when taxes amount to more than \$3 a ton, as they have in cases in the past, the miner's situation becomes difficult. This would be on ore selling at lower Lake ports at near \$1.50 a ton. In 1930 ad valorem taxes paid by Minnesota mines amounted to \$17,086,000, to which was added more than 20 per cent on account of occupational and royalty taxes, until the total tax assessed against the mines was \$20,735,645, or 59c. a ton on all ore produced. For 1931 the figure was considerably higher.

Restiveness on the part of operators frequently has been aggravated by the attitude of some of the lessors' field agents, men employed to see that lease conditions are complied with. The rulings of these men as to the mining of scrap and marginal tonnages often have been such as to put lessees to heavy expense, and have resulted in much friction.

It is understood that this effort to lower royalties has been most active among those whose leases either are at a high rate, or on substandard or washable ores, or both, and on leases that have yet a very considerable time to run; and that, so far as the Mesabi range is concerned, it applies chiefly to the Western portion of the district.

That such an effort as this can be undertaken in Minnesota is an indictment of the State's taxation policy. It has its strength by reason of greed in the part of taxing powers, long continued and ever increasing. For years mining interests have made an able fight against taxation policies, and the arguments advanced at every session of the legislature for a score

of years should have convinced fair minded and unprejudiced men looking toward the best interests of the commonwealth. But they have had little effect.

In addition to these negotiations others are in progress, also affecting royalties. They have been undertaken because of the probability of small sales of ore this season. These have to do with the cessation of all royalty payments for the year. Compromise arrangements along this line already have been agreed upon in a number of cases, and others are pending.

Business Revival Will Release Large Machine Tool Purchases

(Concluded from page 713)

change in process has changed our production time per piece from 25 min. to 17 min. It is this improvement which has induced us to add three new grinders this year."

Only Await Signs of Better Times

The large number of responses to the questionnaire and the tenor of many of the accompanying letters make it plain that dull times have been taken advantage of to give plant equipment and methods the closest scrutiny, to the end that all possible improvements may be adopted when business conditions warrant a loosening of purse strings. The following excerpts from one of the letters received is revealing:

"Although this decrease in orders and the unmeasurable embarrassment upon the part of employees, as well as the reduced income of producers, have been unavoidable as I see it, yet this condition has brought with it, to a very large measure, a decided benefit. We have had ample time carefully to check our equipment and our methods.

"We have found many obsolete machines and equipment which, in the pressure of business which followed the world war, were overlooked and we continued to pay handsomely for the losses which came from those machines and methods.

"We have not only weeded out men but have condemned machines. We have used our unemployed in putting our shops in shape, and once in many years we have come face to face with the actual conditions of our equipment. In short, we have had an opportunity to look at ourselves squarely and determine more accurately the real condition of our equipment. You are wise in concealing the identity of those who respond to your questions, as there are very few, I am sure, who would enjoy reading their mistakes in print.

"We have, during the past eight

months, gone over every piece of equipment and repaired such as could be repaired. New parts have been ordered and added to equipment. Equipment needed has been listed for purchase as the return of business demands it. Our entire shop has been rearranged, giving us sufficient space to accommodate the new machines which will be ordered. There was not one belt in our shop which was not repaired, not one machine which has not been improved by repairing; in fact, many of our machines received the first genuine cleaning they have had since they were installed. When the grime and dirt was scraped off defects began to show and we really found out the conditions of our machines which we believed were in satisfactory condition."

Otis Steel Co., Cleveland, reports an operating profit of \$264,370 in 1931. After charging off depreciation and paying bond interest, the year's operation showed a net loss of \$1,571,342. This compares with net earnings of \$868,730 in 1930. During the year \$1,377,541 for maintenance and renewals was charged to operations. The balance sheet as of Dec. 31 shows a number of changes represented chiefly by reduction of inventories and by increases in plant account and current debt. These changes are accounted for by the erection of a new continuous wide strip mill.

Westinghouse Electric & Mfg. Co., East Pittsburgh, had net loss in 1931 of \$3,655,659, compared with a profit in the preceding year of \$11,881,705. Sales billed last year amounted to only \$115,393,082, compared with \$180,283,579 in 1930. Because of certain orders for large equipment, notably electric locomotives for the Pennsylvania Railroad electrification, the value of unfilled orders, as of Dec. 31, 1931, was \$40,024,390, compared with \$40,208,181 one year previous.

PLANT EXPANSION AND EQUIPMENT BUYING

Amtorg Again Seeking American Tools

THE Amtorg Trading Corp., New York, official buying representative of Soviet Russia, is again negotiating for the purchase of a large number of machine tools in the United States. Although Amtorg has been almost continuously in the market for equipment on its own terms which are now for payments over 20

months, it has become more active, presumably because of restricted credit policies in Germany, where a considerable part of its recent buying has been done. It is said that a few American companies have taken orders, principally for tools they had in stock.

Machinery trade throughout the

Soviet Buying Agency Sends Out Inquiries and Has Made a Few Purchases

New York

Except for greater buying activity on the part of the Amtorg Trading Corp., official buying representative of the Soviet, the local machine tool market continues very dull. A very slight improvement has occurred in sales of single tools this month.

Cleveland

The machinery market remains dull and little business is in prospect in the near future. Some shops making small automobile parts evidently have become busier, as is indicated by an improved demand for dies and chasers. The Winton Engine Works, Cleveland, has received an order from the L. H. Mathis Co., Camden, N. J., for four 600-hp. Diesel engines and auxiliary equipment for 165-ft. boats to be built by the Camden company for the United States Coast Guard.

Milwaukee

Machine tool inquiry is of moderate proportion, but disappointment is expressed over the fact that prospective purchasers are slow in acting on quotations. As a result, business remains restricted and is barely above the January-February average. Production is of small volume, although special tool and repair departments are operating at a fair rate.

Pittsburgh

Machinery users in this district are still confining activity to inquiry, although a few small purchases are reported from week to week. Some Government work for river improvement is being placed, principally from the local office of the United States Engineer. Municipal purchases are lacking except those by the Board of Education for high school manual training shops.

Steel companies are placing little

equipment, but several are making estimates for mills which would reduce costs on flat-rolled products. Makers of heavy equipment and machinery have little backlog business on their books and are not busy.

Chicago

The machinery market is quiet except for orders for a horizontal boring mill and a radial drill placed by a jobbing shop. A recent private showing indicated buyer interest in developments but not in placing

country remains very dull. Little business appears to be in prospect. Although a large number of quotations are outstanding, action is being taken in only a small minority of cases.

An inquiry has appeared at Cincinnati for gun lathes and rifling machines.

orders. Where equipment is being liquidated the small pieces move fairly well, but demand for large machines is sluggish. Small tools are less active.

Cincinnati

General business dullness is reflected by continued quietness of the machine tool market and scattered orders for single small tools. Inquiry for gun lathes and rifling machines carrying 52-in. beds is the only pending business of interest.

NEW YORK ▶

Interborough Rapid Transit Co., 165 Broadway, New York, will carry out expansion and improvements, to cost \$2,244,000, including power equipment and facilities, \$540,000; signal equipment for Queens Borough lines, \$250,000; new cars, \$1,200,000; tracks, crossovers, third rail connections, yard betterments, etc.

General Electric Co., Schenectady, has plans by General Electric Realty Co., 120 Broadway, New York, for three-story factory branch, storage and distributing plant, 210 x 220 ft., at Minneapolis, where site was recently purchased. Bids scheduled to be asked on general contract early in April. Cost over \$200,000 with equipment.

L. & L. Electric Mfg. Corp., Brooklyn, has been organized by Charles Lefkowitz, 2704 University Avenue, Bronx, and William Litner, 157 East Ninety-first Street, Brooklyn, to manufacture electric generating equipment, parts, etc.

Commanding Officer, Picatinny Arsenal, near Dover, N. J., asks bids until April 4 for air-conditioning system (Circular 280).

New York Steam Corp., 280 Madison Avenue, New York, has sold bond issue of \$8,700,000, part of proceeds to be used for extensions and improvements. Company recently secured contract for furnishing service in Rockefeller Radio City development.

Fred Goat Co., Inc., 314 Dean Street, Brooklyn, operating general machine works, leased one-story building at Dean Street and Third Avenue for expansion.

Albany Port District Commission, 74 Chapel Street, Albany, N. Y., Peter G. Ten Eyck, chairman, asks bids until April 11 for terminal grain elevator, capacity 2,500,000 bu., includ-

ing unloading equipment, car and watercraft moving equipment, car shovels, conveyor, storage bins of self-cleaning type, electrical signal system, etc., loading galleries and spouts, millwright shop, with forge and equipment. Cost about \$850,000. Arnold G. Chapman is chief engineer.

Universal Stamping Corp., Brooklyn, has been organized by Jerome and George Isakson, 1712 Forty-ninth Street, and Philip W. Heiss, 631 Seventy-first Street, to manufacture stamped metal specialties.

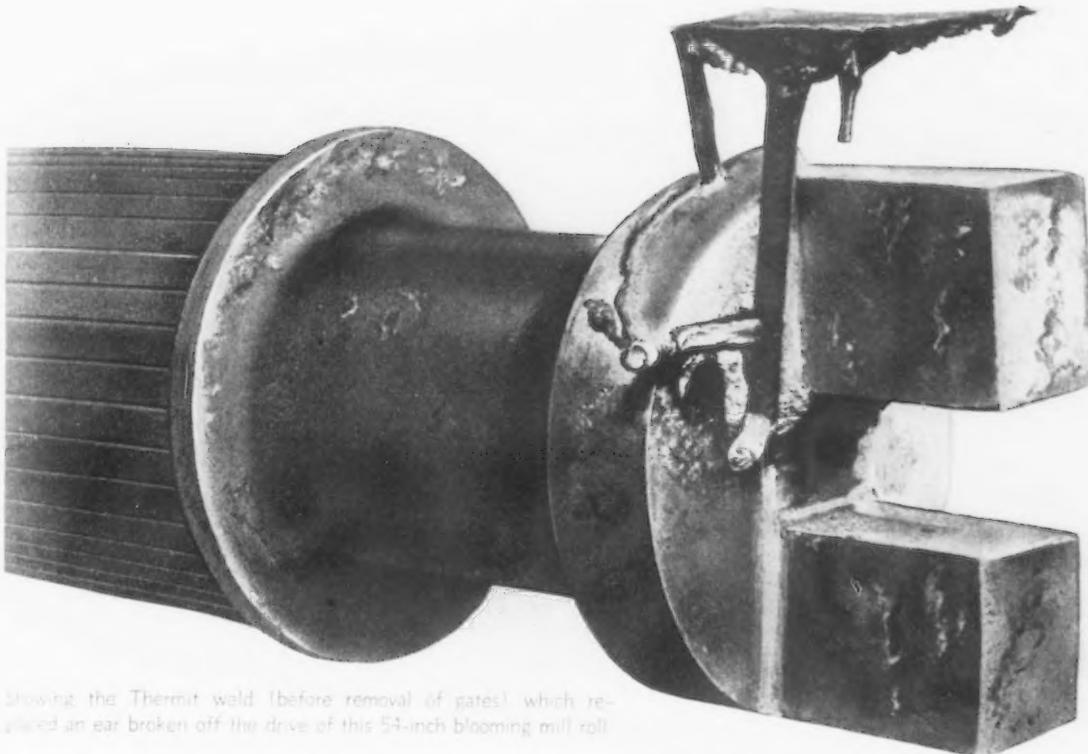
Lighting Appliance Co., 9 Deshusses Street, New York, manufacturer of electric lighting fixtures and equipment, is considering branch plant at Montreal. Cost over \$35,000 with equipment.

West Hoboken Plumbing Supply Co., 40-42 Paterson Plank Road, Union City, N. J., plans rebuilding storage and distributing plant, pipe shop, etc., recently destroyed by fire. Loss over \$35,000 with equipment.

J. N. Pierson & Son, 198 Jefferson Street, Perth Amboy, N. J., architects, soon take bids for a one-story industrial plant at Bound Brook, N. J. Owner's name temporarily withheld. Cost over \$35,000 with equipment.

Catskill Foundry & Machine Works, Catskill-on-Hudson, N. Y., has changed its name to Parker Freezer & Machine Corp., and has increased its capital stock from \$50,000 to \$300,000, to provide funds to carry on two new lines of work, manufacture of building drains and electric freezers. Company's general line of foundry and machine shop work will be continued as heretofore.

Department of Hospitals, Municipal Building, New York, has plans for addition to steam power plant at Bellevue Hospital. Cost over \$125,000 with equipment. C. B. Meyers, 21 Union Square, is architect.



Showing the Thermit weld (before removal of gates) which replaced an ear broken off the drive of this 54-inch blooming mill roll.

You save two ways with Thermit Welding

First, when you repair or build up a worn or broken part with Thermit Welding, you save the difference between the cost of the repair and the cost of a replacement. That difference may range between 50 and 85 per cent.

Second, when you Thermit weld, you return the part to service in but a fraction of the time usually required to obtain a new part. With Thermit Welding, long, costly shutdowns are avoided.

As the master tool of maintenance, Thermit Welding offers a quick, economical way of permanently building up worn wabbler ends and pinions . . . of making lasting repairs on broken mill rolls, housings, cast iron press heads, and other parts. Thermit repairs are permanent because Thermit steel is almost invariably superior to the parent metal.

Let us send the pamphlet, "Thermit Welding and the Steel Mill," which contains details, and suggests numerous applications.

METAL & THERMIT CORPORATION, 120 BROADWAY, NEW YORK, N.Y.

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M and T products include numerous alloys and special metals—pure chromium, pure manganese, pure tungsten, ferro-titanium,

ferro-vanadium, ferro-tungsten, manganese copper, manganese titanium, manganese boron, cobalt copper, pig tin, dephosph billets.

Department of Water Supply, Gas and Electricity. Municipal Building, New York, William W. Brush, chief engineer, plans installation of pumping machinery, power and other equipment in connection with development of additional sources of water supply on Long Island. Total cost \$5,000,000.

New York Central Railroad Co., Grand Central Terminal, New York, is increasing operations at repair shops at West Albany, N. Y., adding over 1700 men to working force during past fortnight.

◀ SOUTH ATLANTIC ▶

Joslyn Co., Ninth Street and Chesapeake Avenue, Baltimore, manufacturer of electric line equipment, cross-arms, etc., let contract to George O. Hansen, 123 North East Avenue, for one-story addition, 179 x 203 ft., for storage and distribution.

Virginia Public Service Co., Charlottesville, Va., has purchased municipal electric light and power plant at Farmville, Va., and will carry out expansion, including transmission line from generating station at Bremo, Va., to Farmville and vicinity, about 40 miles.

Eureka Cotton Mill, Chester, S. C., let general contract to Potter & Schackelford, Greenville, S. C., for three additions, two two-stories, 150 x 180 ft., and 75 x 100 ft., respectively, and one one-story, 128 x 218 ft. Cost \$100,000 with equipment. J. E. Surrine & Co., Greenville, consulting engineers.

H. W. Clodfelter Roofing & Sheet Metal Co., Inc., Winston-Salem, N. C., has been organized by H. W. Clodfelter, 628 Brookstone Avenue, and associates, capital \$50,000, to manufacture metal roofing and other sheet metal products.

Inland Waterways Corp., Munitions Building, Washington, asks bids until April 18 for construction of two 100-hp. twin-screw Diesel towboats.

◀ PHILADELPHIA ▶

National Portland Cement Co., Finance Building, Philadelphia, recently organized, has plans for new mill near Brodheadsville, including power house, machine shop and other structures. Over 200 acres of land has been purchased. Cost about \$2,000,000 with machinery. Construction will be carried out by Arthur P. Housner, Evans, Pa., a director of company. Robert H. Anderson is president and Fred B. Franks, Sr., vice-president and general manager.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 5 for 50 aircraft directional gyro (Schedule 715) for Philadelphia Yard.

Board of Education, Wilmington, Del., will install manual training shops in new school at Thirty-sixth and Jefferson Streets. Bids will be asked at once on general contract. Cost about \$435,000. E. William Martin, DuPont Building, architect.

Cumberland County Gas Co., Millville, N. J., has plans for new artificial gas plant with storage and distributing facilities. Cost over \$100,000 with equipment. Ford, Bacon & Davis, Inc., 39 Broadway, New York, consulting engineer.

William Miller, Philadelphia, leased space in building at 620 Arch Street, for a machine shop.

Board of Trustees, Hershey Industrial School, Hershey, Pa., has plans for group of new buildings to accommodate about 400 boys, making facilities for 1000 students. Cost over \$2,000,000 with equipment. P. D. Witmer, Hershey, architect. Institution is interest of Hershey Chocolate Corp., Hershey.

◀ MILWAUKEE ▶

Waukesha Motor Co., Waukesha, Wis., manufacturer of industrial gasoline and Diesel engines, has booked orders for 500 engines, one customer purchasing 400 units and six others smaller lots. Some departments have been placed on full time and 100 men have been recalled, increasing the payroll to about 500.

Harley-Davidson Motor Co., Milwaukee, has received order from Police Department, Los Angeles, for fleet of 57 motorcycles. Orders from similar sources so far this year are reported 19 per cent ahead of same period of 1931.

Seaman Body Corp., Milwaukee, manufacturing all enclosed bodies for Nash Motors Co., Kenosha, Wis., has recalled 300 men and now has force of 2300 on full time schedule. Payroll at present is largest since early summer of 1931.

◀ GULF STATES ▶

Common Council, Muenster, Tex., plans installation of 50,000-gal. tank on 50-ft. tower, and auxiliary equipment for municipal waterworks. Montgomery & Ward, Wichita Falls, Tex., consulting engineers.

United States Potash Co., affiliated with Monolith Portland Cement Co., 215 West Seventh Street, Los Angeles, has approved plans for new potash refinery at Loving, N. M., with power house, machine shop and other buildings. Plant will be connected with company potash mines by private railroad about 12 miles long. Cost about \$850,000 with machinery.

Board of Education, San Antonio, Tex., plans erection of one-story manual training shop, 62 x 110 ft., at new Phillips Wheatley high school for colored students. Bids on general contract until March 29. Entire cost over \$200,000. Phelps & Dewees, Gunter Building, are architects; L. D. Roy, Smith-Young Tower, mechanical engineer.

W. E. Brown, Brown & Hancock, 1503 First National Bank Building, Dallas, is at head of project to develop cinnamon mineral lands in Arkansas. It is proposed to install crushing plant, mechanical-handling equipment, power station, machine shop and other structures.

Board of Regents, University of Texas, Austin, Tex., is arranging list of equipment for installation in new four-story engineering building, on which work is being placed underway, to include hydraulic and highway engineering testing laboratories, concrete mixing materials laboratory, general electrical and mechanical laboratories, and petroleum engineering division. Cost over \$200,000 with equipment. Herbert M. Greene, LaRoche & Dahl, Construction Building, Dallas, Tex., are architects.

Brent Hydraulic Brake Co., Orange, Tex., has been organized by George R. Brent, Orange and associates to manufacture mechanical brakes and devices.

Baker Ice Machine Co., Inc., Evans Street, Omaha, Neb., manufacturer of ice-making and refrigerating machinery, parts, etc., has arranged for establishment of new factory branch, storage and distributing plant at Dallas, Tex.

City Council, Beaumont, Tex., secured low bid on general contract from King-Huff Construction Co., Beaumont, for one-story hangar, with repair facilities and administration building at municipal airport. Irby & Woodside, Goodhue Building, architects.

◀ CHICAGO ▶

Midwest Refining Co., 910 South Michigan Avenue, Chicago, has authorized erection of new gasoline refinery at Casper, Wyo., replacing obsolete units. Cost over \$200,000 with machinery. Company is also carrying out electrification program at plant.

Gellman Mfg. Co., Rock Island, Ill., manufacturer of wrenches, tools, hardware specialties, is considering erection of one-story foundry. Cost over \$40,000 with equipment.

Vending Machine Co. of America, Inc., Tulsa, Okla., manufacturer of cigarette vending machines, etc., has leased two-story and basement factory at 5642 Lake Park Avenue, Chicago, for branch plant.

Midland Oil Refining Co., Midland Savings Building, Denver, is negotiating for purchase of about 11 acres in Adams County, as site for new oil refinery, including gasoline refining unit, storage and distributing facilities. Cost about \$225,000 with equipment.

Gardner-Denver Co., Quincy, Ill., and Denver, manufacturer of pumping machinery, air compressors, rock drills, etc., has plans for branch plant for parts manufacture and assembling at Toronto, to be operated by a subsidiary, Gardner-Denver Co. of Canada, Ltd.

Board of City Commissioners, Williston, N. D., asks bids until April 4 for four pumping units with accessories, capacities of 3000, 900, 800 and 400 gal. per min., electrical equipment, valves, controllers and other machinery for waterworks. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is consulting engineer.

Common Council, Sumner, Iowa, has called special election to approve bond issue for \$95,000 for municipal electric light and power plant. H. L. Cory, 3905 North Seventeenth Street, Omaha, Neb., is consulting engineer.

City Council, Lake Forest, Ill., asks bids until March 30 for dual driven horizontal centrifugal pumping unit, 3600 gal. per min. capacity, with auxiliary equipment. A. Duane Jackson, acting city clerk.

Common Council, Moose Lake, Minn., will soon begin erection of municipal electric light

and power plant. Cost about \$73,000 with machinery. G. M. Orr & Co., Baker Building Minneapolis, are engineers.

Chicago Repair & Sales Co., 1528 South Crawford Avenue, Chicago, has purchased goodwill and equipment of Swanson Washing Machine Mfg. Co., which is in receivership.

Central Broadcasting Co., Des Moines, Iowa, operating radio stations WOC and WHO, Des Moines and Davenport, Iowa, plans new broadcasting station near Mitchellville, Iowa, with steel towers, power facilities and other operating equipment. Cost about \$125,000.

◀ CLEVELAND ▶

Industrial Rayon Corp., West Ninety-eighth Street and Walford Avenue, Cleveland, has general contract to George A. Rutherford Co., 2725 Prospect Street, for one-story addition, 33 x 200 ft. Cost about \$175,000 with equipment. Christian Schwarzenberg & Gaede Co., Union Building, architect and engineer.

Strong Mfg. Co., Sebring, Ohio, manufacturer of enamelware, is being reorganized and fund of \$50,000 arranged for immediate resumption of production, following shut-down for several weeks.

Department of Water, Toledo, Ohio, William G. Clark, water commissioner, is considering extensions and improvements in pumping plant and waterworks station, to cost over \$40,000 with equipment; also replacement of pipe lines under river at Adams and Walnut Streets, cost about \$250,000; extensions and improvements at filtration plant, cost about \$350,000 with equipment.

Titan Valve & Mfg. Co., Cleveland, has been organized by J. H. T. Miller, 635 Guardian Building, and associates to manufacture valves and kindred steam specialties.

Ford Motor Co., Dearborn, Mich., has purchased 50 acres at Richmond Village, near Painesville, Ohio, to be used for new assembling plant later.

◀ INDIANA ▶

Central Transfer & Storage Co., 118 South Alabama Street, Indianapolis, leased former plant No. 1 of Marmon Motor Car Co., containing 25,000 sq. ft. floor space, for automobile service, repair and storage unit for motor trucks, trailers and other equipment. Complete machine shop will be provided.

Auburn Foundry, Inc., Auburn, has been organized by B. O. Fink and William H. Hembach, Auburn, to manufacture metal castings.

Meshberger Brothers Stone Co., Linn Grove, near Decatur, and plans installation of additional machinery to provide production of about 8000 tons a month.

Bendix Aviation Corp., South Bend, will carry out large commercial production of new type heavy-duty carburetor at Stromberg Carburetor Division, Eclipse Aviation Co., East Orange, N. J., main aeronautical subsidiary, is running about 35 per cent ahead of estimated schedule.

New York Central Railroad Co., is increasing operations at Beech Grove repair shops, near Indianapolis, and has added about 100 men to force during past fortnight.

◀ NEW ENGLAND ▶

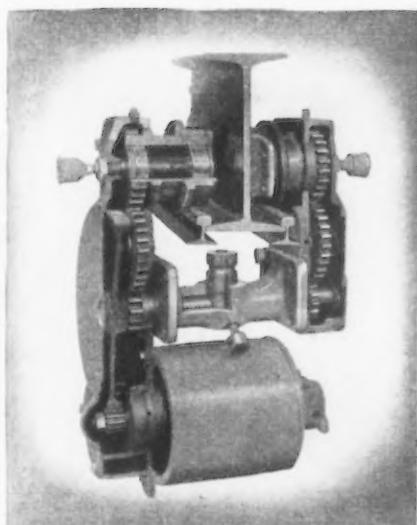
Service Battery Shop, 263 Broadway, Providence, R. I., automobile batteries and repairs, plans one-story shop at Auburn, R. I. Cost about \$40,000 with equipment. Francis Chiaverini, 32 Broadway, Providence, is architect.

Trimount Dredging Co., 10 State Street, Boston, plans replacement of floating power plant, recently destroyed by fire and sunk in Charles River basin. Loss about \$100,000 with machinery.

Viking Flying Boat Co., Inc., New Haven, Conn., organized by Barclay Robinson and L. F. Robinson, Jr., both of Hartford, Conn., capital \$50,000, to take over and expand company of same name at 80 Shelton Avenue, New Haven. Work is under way on hangar, 85 x 100 ft., with repair shop, 25 x 75 ft., at marine airport. Administration building also will be built. Cost over \$75,000 with equipment.

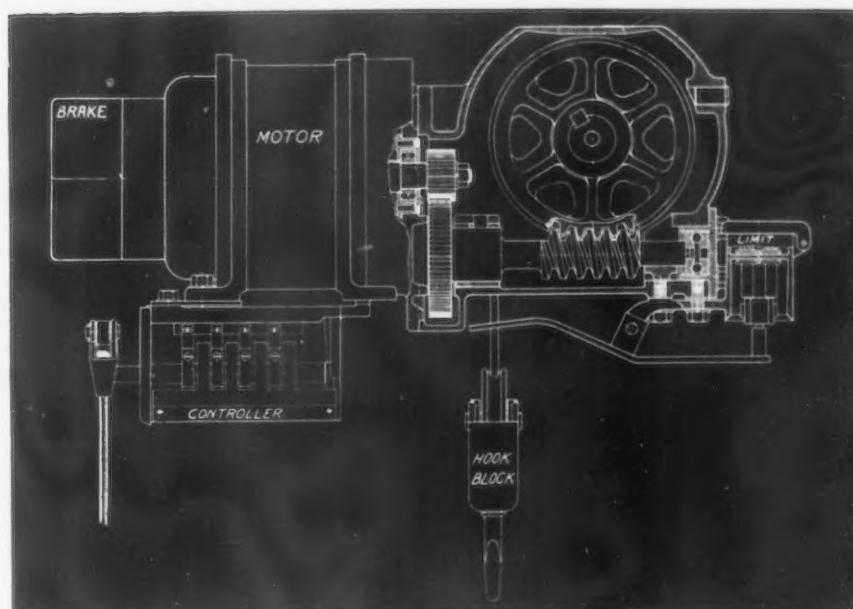
Crawford Machine Co., Central Avenue, Weymouth, Mass., plans rebuilding portion of plant recently destroyed by fire. Cost over \$40,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April



Note the balance obtained by locating the motor beneath this new trolley.

New Trolley adds valuable features to the Sprague Electric Hoist



The simplicity of the Sprague Hoist design is clearly shown by this sectionalized illustration.

SMALLER radius curves in the monorail track can now be negotiated with ease, because of the free swiveling of this perfectly balanced trolley. Moreover, by locating the motor beneath the trolley, space has been saved so that the hoist can pass through very small clearances and narrow switches. And ball bearings have been engineered into the design to assure lasting efficiency of performance with a minimum of maintenance.

The Sprague Hoist with its rugged simplicity of design, combines with this trolley to form extremely efficient motor driven trolley hoists for both cage and floor operation. They are ideal for use on monorail track, transfer cranes and single I-Beam cranes.

Hoist and trolley, alike, are

completely enclosed in dust and moisture proof housings. Lubrication is automatic, and this feature in conjunction with the extensive use of ball bearings decreases friction and wear to a minimum. Low cost load handling and truly dependable performance are assured. You will find a comprehensive description of the many types

of Sprague Electric Hoists in Bulletin S-104. Included are hoists ranging in capacity from $\frac{1}{4}$ ton to 6 tons, with push button pendant rope, rod or cage control. A copy of this bulletin is freely offered and so is our cooperation in applying the proper hoist to any service.



SPRAGUE HOIST

DIVISION OF SHEPARD NILES CRANE & HOIST CORPORATION

226 South Charles Avenue
Montauk, New York



Works: Montauk, N.Y.
St. Philadelphia, Pennsylvania

THE MOST COMPLETE LINE OF CRANES & HOISTS IN AMERICA

5 for three hydraulic pumps for Portsmouth Navy Yard (Schedule 7706).

E. W. Skinner Co., Pearl Street, Fitchburg, Mass., manufacturer of oil burners, has tentative plans for an addition to cost \$10,000 without equipment.

◀ BUFFALO ▶

L. C. Smith & Corona Typewriters, Inc., 701 East Washington Street, Syracuse, N. Y., has leased property at Toronto for new branch plant for both parts production and assembling. Output will be developed for Canadian and British markets, including standard and portable typewriters.

Dunwell Mfg. Corp., Buffalo, has been organized by Jack W. Hess and Jacob L. Stern, 951 West Ferry Street, to manufacture coin packaging equipment and devices.

Union Hill Canning Co., Union Hill, N. Y., plans rebuilding portion of plant recently destroyed by fire. Loss about \$50,000 with machinery.

Alo Products, Inc., Dunkirk, N. Y., a division of American Locomotive Co., New York, has acquired Jackson Engineering Corp., Tulsa, Okla., manufacturer of equipment for oil and natural gas industries. Gordon M. Jackson, heretofore president of purchased company, will become sales manager for Alo company.

◀ CINCINNATI ▶

Davidson Enamel Products Co., Lima, Ohio, let general contract to W. J. Fitzgerald, Lima, for one-story addition, including improvements in present plant. Automatic conveyor system and other equipment will be installed.

Board of Public Works, Nashville, Tenn., plans improvements in power plant, including installation of boilers, stokers and accessories. Cost about \$75,000.

United States Engineer Office, Memphis, Tenn., asks bids until April 1 for 5,000,000-ft. non-corrosive permanent anchoring wires, 4,000,000 non-corrosive bracket assembly clips, 600,000 non-corrosive end loop assembly clips, tools for placing bracket and end loop assemblies (Circular 522).

Miami Art Metal Co., Middletown, Ohio, has been organized by James L. and James W. Ash, Middletown, to manufacture ornamental metal products.

City Council, Greenville, Ohio, considering installation of 500,000-gal. water standpipe in connection with extensions and improvements in municipal waterworks.

◀ ST. LOUIS ▶

City Council, Wichita, Kan., asks bids until March 28 for 25,000-gal. steel tank on 75-ft. tower; turbine centrifugal well pump with auxiliaries, capacity 100 gal. per min.; steel shell for casing of well, etc. Black & Veatch, Mutual Building, Kansas City, Mo., are consulting engineers.

W. G. Shelton Co., Inc., 1700 Locust Street, St. Louis, manufacturer of electrical appliances and devices, plans early operation of branch plant at Hamilton, Ont. A Canadian subsidiary, with capital of \$50,000, will carry out work.

Schubert-Christy Corp., Afton, St. Louis, has been organized by F. H. Schubert and associates to take over and expand company of same name with plant on New Hampshire Avenue, manufacturer of power plant and ice plant machinery, cooling towers, heating and ventilating equipment.

Herndon Drilling Co., Tulsa, Okla., plans replacing rotary oil drilling equipment, recently destroyed by fire while in service at properties of Stanolind Oil & Gas Co., San Angelo, Tex. Loss over \$75,000.

City Council, Blackwell, Okla., is considering rebuilding of hangar with repair shop at municipal airport, recently destroyed by fire. Loss over \$15,000 with aircraft.

City Council, Oswego, Kan., asks bids for installation of municipal gas distributing system. W. S. Ruggles & Co., 101 West Sixth Street, Emporia, Kan., consulting engineer.

New Method Silica Co., Rogers, Ark., has leased about 100 acres of silica lands about two miles north of city, and plans installation of equipment for development, including new milling plant for refining service. Cost over \$45,000 with equipment.

American Airways, Inc., operated by Universal Air Lines, Inc., Lambert-St. Louis Fly-

ing Field, St. Louis (Robertson), is arranging for lease at airport, Omaha, Neb., and plans erection of hangar with repair and reconditioning shop.

◀ PITTSBURGH ▶

United States Engineer Office, Pittsburgh, asks bids until April 6 for power plant machinery for recently completed locks at Rostraver, Monongahela River.

Greenville Steel Car Co., Greenville, Pa., plans rebuilding machine shop and pattern shop recently destroyed by fire. Loss about \$50,000 with equipment.

Baltimore & Ohio Railroad Co., Baltimore, has plans for three-story and basement warehouse, 85 x 290 ft., at Pittsburgh, to be used by Pittsburgh Junction Railroad Co., Pittsburgh. Cost over \$100,000 with equipment. L. P. Kimball, company architect, address noted.

Wheeling Coal Co., Wheeling, W. Va., plans rebuilding tipple and other structures at coal-mining properties in South Side district recently destroyed by fire. Loss close to \$70,000.

Ford City Sanitary Co., Ford City, Pa., has been organized by H. M. Fisher, Ford City, and David E. Gulick, Kittanning, Pa., to manufacture iron and steel sanitary products, plumbers' supplies, etc.

Northfork Water Co., Northfork, W. Va., plans rebuilding pumping plant, recently destroyed by fire.

◀ DETROIT ▶

United States Coast Guard Service, Milwaukee, has plans for steel tower for lookout station at Sugar Island, near Sault Ste. Marie, Mich., with electric lighting station. David K. Robinson, Gas Light Building, Milwaukee, is associate civil engineer.

Great Lakes Mfg. Co., Fourth and Mulberry Streets, Wyandotte, Mich., has been organized by Thomas H. Conway and Lewis H. Daily to manufacture aluminum, bronze, brass and other metal castings.

Hugh M. Hall, Eaton Rapids, Mich., is completing plans for manufacture of air conditioning equipment, recently invented, and will assemble units of capacity for handling about 30,000 cu. ft. air an hour for washing and purifying.

Fisher Body Co., Pontiac, Mich., producing bodies for Pontiac automobiles, is running on production schedule of over 485 bodies daily, with close to normal working force.

Karl Mfg. Co., 640 Front Avenue, N. W., Grand Rapids, Mich., has been organized by William E. Karl and John Vanderveen to manufacture implements and tools, iron castings, etc.

◀ PACIFIC COAST ▶

Los Angeles City Park Department, City Hall, Los Angeles, has plans for equipment service and repair building in Solano Canyon, Elysian Park, one story, 22 x 100 ft.; also for similar unit in Arroyo Seco district.

Board of County Supervisors, San Diego, Cal., plans electric light and power plant for San Diego County Hospital. Cost over \$65,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for five industrial buildings at naval air station, Sunnyvale, Cal. (Specification 6791).

O. B. Aman, 451 Ninth Street, San Bernardino, Cal., is planning purchase of semi-Diesel engine unit, with generator and accessory equipment for proposed power station at mining properties near Amandale, Colo.

Kaweah Quarries, Inc., Woodlake, Cal., recently organized, has taken over properties of Kaweah Quarries Co. New company plans expansion and improvements, with installation of crushing machinery and auxiliary equipment. Cost about \$15,000. A. C. Root, heretofore head of quarry company, will continue division for agricultural lime production, installing additional equipment.

L. J. and R. S. Peters, 530 Malden Street, Portland, awarded general contract to G. Wiley Cook, 1080 Glenwood Street, for one-story machine shop, 50 x 80 ft.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 5 for two motor-driven screw-cutting lathes (Schedule 7732), 21,600 lb. steel forgings (Schedule 7730) for Mare Island Navy Yard; five oil and pump burners, one indicating and recording control equipment (Schedule 7526).

for Puget Sound Navy Yard; until April 1 for one motor-driven mortising machine (Schedule 7721) for San Diego Navy Yard.

Board of Public Works, Seattle, J. D. Ross superintendent, city light department, will ask bids soon for power plant on Skagit River, near Newhalem, Wash., including tailrace for hydroelectric power service, transmission lines from plant site, known as Diablo station, to Gorge power plant.

City Council, La Habra, Cal., plans installation of pumping machinery and other equipment for municipal water system. Special election will be held April 11 to approve bonds for \$100,000 for work. Koehig & Koehig Rowan Building, Los Angeles, are consulting engineers.

◀ CANADA ▶

Landis Machine Co., Waynesboro, Pa., has decided to manufacture its product for Canadian trade at plant of Canadian Landis Machine Co., Crowland, Ont., which has been idle for some time.

Central Quebec Light & Power Co., Sherbrooke, Que., plans expenditure of \$1,250,000 on hydroelectric power plant on St. Francis River and erection of a plant in west end of city for grinding pulpwood.

Blairmore Iron Works, Ltd., Blairmore, Alta., suffered a loss of \$40,000 by fire recently.

Pressure Pipe Co. of Canada, Ltd., Royal Bank Building, Vancouver, B. C., has let contract to Stewart & Watson, 615 West Pender Street, for first unit of a pipe foundry. R. W. Mitchell is engineer.

◀ FOREIGN ▶

Department of State Railways, Government of Rumania, Bucharest, will receive bids at once for electrification of lines in Campina-Brasov district, including electric generating equipment, transmission lines, feeder lines, electric locomotives and other equipment. Cost, 900,000,000 lei (about \$5,500,000).

Ford Motor Co., Dearborn, Mich., plans establishment of assembling plant near Athens, Greece. Cost over \$400,000.

Soviet Russian Government, Moscow, has plans for development of copper mining properties near Lake Balkhash, designed to be largest copper producing plant in world. Project will include power plant, railroad line, machine and mechanical shops, electric-operated shovels and other machinery for mining. Cost over 60,000,000 rubles (about \$30,000,000); John Calder, construction engineer, is in charge. United Heavy Machinery Industry, Government Trust, is planning erection of new plant in Ural district for manufacture of excavators, including parts production and assembly. Cost, 72,000,000 rubles (about \$36,000,000). Amtrorg Trading Corp., 261 Fifth Avenue, New York, is official buying agency.

Wallace & Tiernan Co., Inc., 11 Mill Street, Belleville, N. J., manufacturer of purifying machinery for water, etc., is planning establishment of branch plant near London, England. Gerald D. Peet, chief engineer, is in England to arrange details.

Molybdenum Corp. of America has moved its offices from 271 Madison Avenue to 500 Fifth Avenue, New York.

Industrial Construction Corp., Ltd., 5125 Santa Fe Avenue, Los Angeles, has taken over the distribution of cranes and hoists in southern California, Arizona, and Lincoln and Clark Counties in Nevada, for the Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y. The president of the Industrial Construction Corp., Ltd., is W. W. McClung, formerly vice-president and production manager of the Union Iron Works, San Francisco. The vice-president, Ray E. Davies, was formerly manager of the crane and hoist division of the Consolidated Steel Corp., Los Angeles. The secretary-treasurer is Elmer Bissell, formerly sales manager and chief estimator of the Union Iron Works.

Lubrication.—Standard Oil Co. of Indiana, 910 South Michigan Avenue, Chicago, will begin publication in April of a series of monographs on the lubrication of various types of equipment for the information of plant production men. All important lines of machinery will ultimately be covered.

THE DAY OF PIG IRON DAWNS



PERSISTENT quest for better ways to make iron led artisans of the Middle Ages through succeeding steps in the evolution of their industry. Bloomaries grew higher and larger, but still produced only wrought or bar iron. In the fifteenth century German and Belgian iron masters conceived the plan of closed furnaces, with strong artificial blast which reduced the ores to molten metal that could be run off into shapes for remelting. At the beginning of the sixteenth century the blast furnace was introduced into England,

cradle of the iron and steel industry, and its real development began. Furnaces sprang up, water power drove the bellows for blasts and the production of charcoal for furnace fuel became at once an industry and a threat to the timber supply of Britain. Midway in the eighteenth century, charcoal scarcity had begun to throttle the industry, and while Britain was producing 18,000 tons of pig iron per year she was importing 20,000 more from Germany and encouraging iron production in the American colonies.

[*Interlake Iron Corporation has six modern blast furnaces in which every resource of modern metallurgy is utilized to give greater service to the user of pig iron. Plant locations are convenient to the most important industrial area of the country and careful attention is given the requirements of its smallest or largest consumer.*]

INTERLAKE IRON CORPORATION
PIG IRON + COKE
PICKANDS, MATHER & COMPANY, Sales Agents
CLEVELAND + CHICAGO + DETROIT + ERIE

Gases in Pipe Cavity and in Gas Holes in Ingots

(Concluded from page 715)

the same may not have a notable amount.

In Rimming Steel

All three common kinds of gas holes are exemplified most clearly in ordinary rimming steel. Skinholes are likely to be present in the lower quarter or half of the ingot, while the upper half usually has none; when they are covered with only a thin skin of metal, they are likely to cause ruinous surface defects in the rolled or forged product.

In one case of rimmed steel examined, the skinhole gas was 80 per cent hydrogen, 4 per cent carbon monoxide, 11 per cent nitrogen and 5 per cent methane (CH_4). The volume of gas obtained, which was collected over mercury, was, at atmospheric pressure and temperature, about that of the holes penetrated by the drill. This was not a bad or even typical case of skinholes, as the primary skin over them was about half an inch thick of clean solid steel, enough to allow good surfaces on the rolled product. But the ingot had risen several inches in the mold after having been teemed, for which reason it was selected for examination.

Intermediate holes, which occur only in rimming steel, are in a zone or layer extending all around and the whole length of the ingot inside the skinholes, with a secondary skin or layer of sound metal between them. The thickness of the two layers together usually tapers toward the top of the ingot; so, while together they may be 2 in. thick at the bottom, they may be not much more than 1 in. at the top. That thickness may indeed be more than that of the primary skin over the skinholes at the bottom, and the upper half of the ingot be more nearly solid than the lower.

Intermediate Holes May Be Welded Up

By one determination intermediate holes were found to be filled chiefly by carbon monoxide, evidently the last of that gas to be rejected by the freezing mushy metal. When in only moderate profusion they seem to work no appreciable harm to the product, and may indeed be closed or even welded up by proper heating and hot-working.

Central holes in varying number

are usually scattered at random along the central portions of the ingot. They are supposed to be caused by and filled with nitrogen and ammonia, but so far as known to us the gas in them has not been analyzed.

The gases in the pipe cavity of rimmed steel, if there is any pipe, which is not usual, may be and probably are substantially different from those in the pipe of killed and partly killed steels.

Gasholes in Abnormal Steels

Abnormal steels may have gas holes not like any of the three common kinds mentioned. Steel cast so cold as to be mushy may have nitrogen bubbles from entrained air, the oxygen whereof having been taken up by the metal. If a mold wash containing organic matter or powdered coal be used, gases derived from it by destructive distillation may enter and be trapped in the metal.

An electric induction furnace steel charge, through some mishap, was held molten for many extra hours. Though it received the usual amount of gas-solvents, the ingots were infested in their interiors by a few curious, long, rambling holes resembling those made in wooden piles by the teredo, though not so numerous. No basis existed for a guess as to what gases caused them. Presumably if the current had been cut off and the metal allowed barely to solidify in the furnace without additions, these gases would have been largely or wholly expelled. Then, on remelting, a normal metal would have been obtained.

In soft steel ingots made for sheets and meant to be killed by a heavy dose of aluminum—12 oz. or more per ton—in the mold, a few shallow skinholes may occur which cause blisters on the sheets. These holes are so different in their character and location from hydrogen skinholes that they are manifestly caused by some other gas.

Ingot May Be Sound Inside, Though Bad on Surface

It is noteworthy that, in a low-carbon ingot, intended to rim in but cast too hot, so that it is badly infested with skinholes, the central portions of the metal inside the zone of holes is likely to be perfectly sound, with neither intermediate nor central

holes. No reason appears to explain the absence of CO and N₂. Manifestly they were either destroyed or wholly expelled or wholly kept in solution. The first case mentioned seems to be most likely for such steel, as it rises in the mold, after teeming has ceased, and emits little or no gas. It may be that manganese or even iron above a certain temperature has power to decompose carbon monoxide.

Whether or not the inert or noble gases of the air, particularly argon, play any part in making holes in steel is unknown, but it does not seem likely that they do.

(To be continued)

Trade Notes

B-B Nut Co., Eighth and Columbia Avenues, Philadelphia, has acquired the sole licenses for United States, Canada and Mexico of all patents of the Safety Nut Corp., Philadelphia.

Alumaweld Sales and Service of Illinois has opened an office at 1632 Palmolive Building, Chicago. R. S. Rickerton is general manager.

Barber-Colman Co., Rockford, Ill., has appointed Brown Tool Co., 10,465 Carnegie Avenue, Cleveland, to distribute its temperature control equipment in some of the northern counties of Ohio.

Clark Controller Co., Cleveland, and its affiliated interests, Sundb Electric Co., Newark, N. J., and Una Welding, Inc., Cleveland, are now represented in the St. Louis territory by David O. Stewart, 619 Bank of Commerce Building, St. Louis.

Foote Brothers Gear & Machine Co., Chicago, has appointed R. Wirth, 617 Merchants Bank Building, Indianapolis, to succeed A. H. Tischer as district representative for the Indiana district, comprising the territory south of Fort Wayne and the Ohio River towns in Kentucky.

New Trade Publications

Oilless Bearings.—R. W. Rhoades Metaline Co., Inc., Long Island City, N. Y. Sixteen-page catalog describing the manufacture, features types and sizes of Metaline oilless bearings and bushings. Use of Metaline plugs of various shapes to protect the rubbing surfaces of machinery is also discussed.

Combustion Indicating and Recording Instruments.—C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. Catalog No. 1025 devoted to construction and operation of the Tag-Mono indicator-recorder for automatic boiler flue gas analyses. The instrument analyzes chemically (Orsat principle) and indicates and records electrically. Single and duplex models are made, the latter indicating and recording CO₂ and CO+H₂.

Indicating, Recording and Controlling Instruments.—C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. General catalog No. 1000, 105 pages, 8½ x 11 in., describes and illustrates the complete line of Tag controllers, recorders, dials, thermometers, hydrometers, oil testing instruments and moisture meters and other instruments.

Slings.—Macwhyte Co., Kenosha, Wis. Catalog of prices, tables and general information on slings and fittings.

Proposed revision of the commercial standard for diamond core drill fittings has been sent to the manufacturers and users for their acceptance by the Division of Trade Standards, Bureau of Standards. The revision is based upon new tolerances adopted by the Diamond Core Drill Manufacturers Association in order to provide for interchangeability of mating parts.

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